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BRIEFLY TOLD.

THE BUREAU OF INFORMATION GOING ON WITH THE GOOD WORK.—We have had occasion heretofore to note the good work that has been accomplished by the Bureau of Information of the American Gas Institute, under the clever leadership of Chairman W. A. Baehr. In fact, the work done by the Bureau has been of an order to fully entitle it to the distinctive appellation of good in every sense. The Bureaucrats have also gone deeper into the spirit of the work as the elasticity thereof becomes the better known, and it is with all possible satisfaction one may declare that good as its made records are, those to be made are sure of being better. Respecting the work for the current year, we are indebted to Chairman Baehr for the following complete indication:

The Bureau of Information, of the American Gas Institute, as approved by the Technical Committee, is now practically complete, and consists of the following members:

Abell, H. C., Am. Light and Traction Co., 40 Wall street, N. Y. City.
Baehr, W. A. (Chairman), 716 Locust street, St. Louis, Mo.
Bond, C. O., U. G. I. Co., Philadelphia, Pa.
Blauvelt, W. S., The Solvay Process Co., Detroit, Mich.
Burgess, C. F., University of Wisconsin, Madison, Wis.
Cornish, R. C., St. Joseph Gas Co., St. Joseph, Mo.
Dewey, V. F., Detroit City (Mich.) Gas Co.
Elliott, A. H., Consolidated Gas Co., N. Y. City.
Eustace, J. H., Peoples Gas Light and Coke Co., Chicago, Ills.
Morris, W. C., Consolidated Gas Co., N. Y. City.
Miller, Thos. D., New Orleans (La.) Gas Light Co.
Macbeth, A. B., Kansas City, Mo.
Rice, H. L., Western United Gas and Electric Co., Aurora, Ills.
Rusby, J. M., U. G. I. Co., Philadelphia, Pa.
Searle, R. N., Rochester Ry. and Light Co., Rochester, N. Y.
Shattuck, J. D., Suburban Gas Co., Philadelphia, Pa.
Waring, Geo. H., Omaha (Neb.) Gas Co.

In addition to the foregoing the Chairman hopes of securing the co-operation of Messrs. Henry L. Doherty and W. H. Barthold. If we are fortunate enough to secure the acceptance of these names, we feel that the Bureau will be greatly reinforced by their co-operation. It is to be noticed that a larger membership than formerly has been provided, in order to enable the Bureau to carry on the work with as little delay as possible, and also to make the burden of the individual members as light as possible. The work of the Bureau for the ensuing year will be carried on in much the same manner as last year. All questions intended for the Bureau of Information should be sent to the Chairman, at No. 716 Locust street, St. Louis, Mo. If such questions are not deemed to be of an advertising nature, nor such as would fall within the legitimate field of the consulting engineer, nor such as to be objectionable from the standpoint of policy, or for any other reason, they will be accepted by the Bureau of Information. Each accepted question will then be taken up by the Bureau to be answered. At the same time each accepted question will be published in the JOURNAL. The Bureau of Information will thereupon proceed to make up its official answer to the question as rapidly as possible, and after agreement has been reached thereon the answer will be published in the JOURNAL. It might be well to emphasize the fact that certain questions very easily fall either in the field of being of an advertising nature, or trespass upon the legitimate field of the consulting engineer. The disposition of these questions is, at best, a delicate problem, and the Bureau will endeavor to act with all circumspection possible in the premises. No record will be kept of rejected questions, nor will numbers be assigned to them. A great many questions submitted to the Bureau require more or less experimental work. For instance, No. 10 was submitted early last year, and one of the members of the Bureau accepted it and started a series of experiments to determine the answer thereto. These experiments have not been completed to date. This simply illustrates the fact that the Bureau, in order to make its work final, will experience more or less delay. If we find a question requires considerable experimental work, we will publish notice in the JOURNAL concerning same, and state when we may expect to secure the results enabling

us to formulate an answer. One of the principal features of the Bureau of Information, and one that we hope to make more prominent as time rolls on, is the portion of our work comprised under the heading of "Answers-at-Large." All questions that are accepted are published in the JOURNAL at the same time the Bureau undertakes to formulate an answer for same. In this way the fraternity at large is advised of the questions that are received. We hope that the fraternity at large will take advantage of the opportunity afforded by our work to contribute and send in answers-at-large to the various questions. The Bureau in all instances will endeavor to formulate a satisfactory answer to each question, but it is universally recognized that a great many members of the fraternity at large have information in their possession which is not generally known, and which, if contributed as an answer-at-large, would form a valuable addition to the literature on the subject. We, therefore, request the fraternity at large to send in as many answers-at-large as they can, and we feel that such answers-at-large will constitute a very valuable portion of the work. Each answer-at-large sent in will be published over the name of the sender. It may be that in some instances certain answers-at-large will cover the ground so satisfactorily that the Bureau will not undertake to formulate better ones. In such cases, the Bureau will state that such particular answer-at-large will be considered as satisfactory to the Bureau.

THE MUELLER EXHIBIT AT THE CHICAGO SHOW.—Among the displays at the recent exhibition of the National Commercial Gas Association in Chicago that attracted much studious attention from the practical portion of the visitors and excited much interest among the laity, was that by the H. Mueller Mfg. Co., of Decatur, Ills., and New York city. An illustration of the exhibit could be reproduced here in a way, but, of course, such would lack the essentials of detail and color, to properly convey to the reader a complete idea of the novelty of the display and effectiveness of the arrangement. Notwithstanding the fact that the Company's line places arbitrary limitations on display, especially when compared to the lines of companies manufacturing illuminating appliances, the Mueller booth was among the most attractive in the armory. It appealed strongly to that division of gas men whose interests are more directly connected with the manufacture and distribution of gas, although those whose efforts are directed in marketing the product found an equal interest in the showing of service clamps, high and low pressure gas cocks, gas plant tools, tapping and drilling machines, meter connections, pipe line tools, pipe jointers, in fact everything that is used about a gas plant or along the mains or service pipe. A more complete line of tapping and drilling machines has never been exhibited and gas men were very much impressed with the showing. This particular line of goods includes 8 tapping machines and 3 drilling machines and covers every phase of tapping and drilling in modern gas practice. The high pressure gas goods of the Company also claimed a large share of the attention of practical men, and this inspection created a very favorable impression. Several members of the firm, assisted by their traveling salesmen, were in constant attendance throughout the exhibition.

CURRENT MENTION.——

AT the annual meeting of the shareholders in the New York and Richmond Gas Company, with headquarters in Stapleton, N. Y., the officers chosen were: President and Manager, Thos. O. Horton; Vice-President and Superintendent, Wm. J. Welsh; Treasurer, R. M. Holmes; Secretary, Edward R. Fielis. A very satisfactory thing in connection with this list is that it goes to show the Company is altogether under the direct management of local men.

ONE of the largest and most up-to-date sets of water gas apparatus was put into operation recently by that truly modern gas man, Mr. Robert M. Searle, in the plant of the Rochester (N. Y.) Railway and Light Company. The apparatus in the main comprises a standard, double superheater, twin generator setting, up to a per diem capacity of 3 millions cubic feet—it is worthy of especial note that this capacity is well in advance of the other water gas apparatus in use. With this installation goes many innovations and refinements: Meters for measuring the quantities of air and steam applied to the setting, and pyrometers for registering the temperatures in the apparatus. The air required is supplied by an electrically driven Sturtevant blower. The set when in full blast will take and use about these quantities of materials per diem: Oil, 13,000 gallons; coke, 19,000 pounds; steam, 84,000 pounds. The installation was designed and constructed by the U. G. I. Company, of Philadelphia, and Mr. D. J. Collins is, naturally and properly, pointing to it with pride.

[Concluded from Page 1097.]

High Pressure Gas Distribution.

[Written for the Third Annual Meeting, American Gas Institute, by MR. JACOB D. VON MAUR, St. Louis, Mo.]

At the present time the territory bordering on the city limits is supplied with low pressure, and the suburban towns beyond are supplied with gas at 30 pounds pressure, using individual governors, as is customary in strictly high pressure distribution. It is contemplated that as the city grows and extends to the high pressure districts the small, wrought iron mains will be replaced as rapidly as they deteriorate with cast iron mains, which will then form a part of the standard system as applied in the city proper. It is thus evident we are taking advantage of all classes of distribution, from the ordinary well known low pressure to the strictly 30-pound high pressure.

In actual practice it is not necessary to lay all of the mains shown on Exhibits B and F, as there are many streets where it is not necessary to lay mains at all, and again there are streets which are built up with such a class of business that 6-inch mains might be placed where 4-inch mains are called for on the exhibit.

Small Cities.—The system is applicable to any city where the number of services per mile of main is sufficient to justify low pressure distribution. The size of the belt line and the general layout of the unit square mile would be dependent on local conditions and the characteristics of the city.

If we assume, for instance, a city of 40,000 inhabitants in an area of 6 square miles, the annual sales would be approximately 160,000,000 cubic feet per annum. Assume number of consumers as 8,000, giving a peak load of 120,000 cubic feet per hour.

Exhibit J shows a square mile of such a city, having 8 blocks to the mile, and consumers on each side of the block. This city can be supplied with 6 inch low pressure mains laid every ¼ mile in both directions, and all other low pressure mains 4 inches in diameter. A manhole would be located in the center, as shown on Exhibit J.

A belt line 8 inches in diameter, as shown on Exhibit K, would supply 52,000 cubic feet of gas at manhole *D*, located 1¼ miles from the works, with 5 pounds initial pressure and 3 pounds final pressure. Allowing 3 pounds pressure at *D* and 2 pounds of pressure at *E*, the mile of 8-inch between these two manholes is sufficient to convey over 40,000 cubic feet of gas. The manhole at *C* would be fed from *E* and *F*, so that the 8-inch main would be ample to supply the entire city. The total cost of a distributing system such as above, with pipes on every street, would be approximately as follows:

29 miles of	6-inch	pipe at	$4,200	per mile....	$121,800
96 "	4- "		2,640	"	253,440
7 "	8- "		5,000	"	35,000
5 manholes at $1,000 each..					5,000
Grand total.....					$415,240

which is at the rate of approximately $69,200 per square mile, or $3,460 per 1,000 peak load capacity.

The above investment in high pressure mains can be materially decreased by increasing the pressure at the works to 6, 7 or even 8 pounds to the square inch. This need only be done during peak load. For instance, with 7 pounds at the works and 4 pounds at manhole *D*, 1¼ miles away from the works, over 70,000 cubic feet of gas per hour can be supplied through an 8-inch main, or 35,000 cubic feet per hour through a 6-inch main.

When we reach cities of from 15,000 to 20,000 inhabitants it is apparent that no size mains need be used other than 6-inch and 4-inch, so that, by cutting out such reducing fittings as 6 by 4 tees and 6 by 4 crosses, etc., the storeroom stock need consist only of 4 and 6-inch drips, crosses, tees, bends, and 6 by 4 reducers, thus reducing the interest charge for stores to a minimum. This system can be easily fitted into any existing system at present operated with low pressure. It can be operated on a medium high pressure basis of from 2 to 5 pounds, should this be desirable. Personally, however, I do not advise even medium high pressure for cast iron mains less than 6 inches nor mains less than 4 inches diameter, for any pressure. It is true that 3-inch and even 2-inch mains are perfectly satisfactory under many conditions, but if it is desired to lay mains of this size it will be best to use 2-inch and 3-inch wrought iron pipe. In Beloit, Wis., this is being done. All service connections are equipped with individual house governors, and future extensions are made with 2-inch wrought iron pipe. The pressure is raised at the works as needed to carry the load. Exhibit L shows the town re-

presented on Exhibit K as being supplied by this method. The belt line from the works is 8 inches as before. All other streets in the city are provided with 2-inch mains. The cost of such a system, with 2-inch mains on every street, would be as follows:

7 miles of 8-inch pipe at $5,000 per mile	$35,000
125 miles of 2-inch W. I. pipe at $1,320 per mile	165,000
Excess cost of 8,000 services equipped with governors, over and above similar cost for low pressure services, estimated at $4.50 per service	36,000
Total	$236,000

which is an average of $39,333 per square mile.

I refer you to a paper read by Mr. Traver, Engineer of the Grand Rapids Gas Company, before the Michigan Gas Association, September, 1906. In Beloit, Wis., all services were equipped with individual governors at one time, whereas in Grand Rapids the change is being made gradually, starting at the works and extending farther out towards the city limits year by year. It does not seem advisable to the writer to use wrought iron pipes in large cities or in any corrosive soil, or where there is a chance of electrolytic action. The advantages of using wrought pipe, and pressures at from 2 to 6 pounds, are as follows:

1. Decreased investment on account of the small wrought iron mains used.
2. Ability to give ample pressure at every consumer's meter.
3. Ability to utilize a simple blower for compression or pumping purposes.

Small Towns.—But in very small towns, or in towns where the consumers are scattered, the consumption is not sufficient to pay a reasonable return, even on the investment necessary to install a system of 2-inch wrought iron mains operated at 2 to 5 pounds pressure. It is in such places where high pressure distribution in its strictest sense finds its best application. The distribution of gas at high pressure in small villages and medium size towns is no longer an experiment, but is a demonstrated, practical and efficient proposition, as is clearly evidenced by such installations as those described in the various papers read before the various gas associations in this country by Messrs. Frederick H. Shelton, E. C. Jones, J. D. Shattuck, G. F. Goodnow, H. L. Rice and many others.

The St. Louis County Gas Company's installation, with which the writer is most familiar, supplies approximately 1,800 consumers through some 60 miles of main, a greater part of which is 1¼ inches diameter, under pressure varying from 15 to 45 pounds. The peak load on this system is at present about 37,000 cubic feet per hour, which may be doubled in the near future. From this it would appear the hourly peak load is approximately 20 cubic feet per hour per consumer. Most of the gas is used for cooking purposes. Practically no trouble has developed in the operation of this system. There have been several cases of pipes being eaten out by electrolysis, and in the beginning a number of the gas seals blew.

Exhibit I shows a pressure chart taken at the pumping station, from which it is seen that the entire system is absolutely gas-tight, there being no actual leakage whatever. This is shown from the fact that during the hours of lightest consumption the pressures drop only a very slight amount, which has all been accounted for by a small number of street lamps, together with the various pilot lamps which are lighted during the night. The disadvantages of high pressure are:

1. The loss of candle power and B.T.U.'s, as pointed out in the answers bearing on this question in an appendix belonging to this paper.
2. The cost of pumping.
3. The shorter life of the wrought iron pipe.
4. The increased expense due to the need of inspecting each consumer's governor, once every 6 months, and which we estimate in St. Louis as equivalent to 30 cents per consumer per year.
5. The increased danger of high pressure, which, from the answers bearing on this subject in the appendix, would not seem very serious, especially in the smaller towns and cities. There is still another objection, which to my knowledge has never before been mentioned, namely, the uncertainty of knowing what pressure exists at the consumer's meter at any particular time.

It has always been assumed that the pressure at the outlet of the governor is a perfect circle. The impression is probably due to the fact that gauges are usually installed at certain points on the distribution line, generally in one of the company's offices or works. As

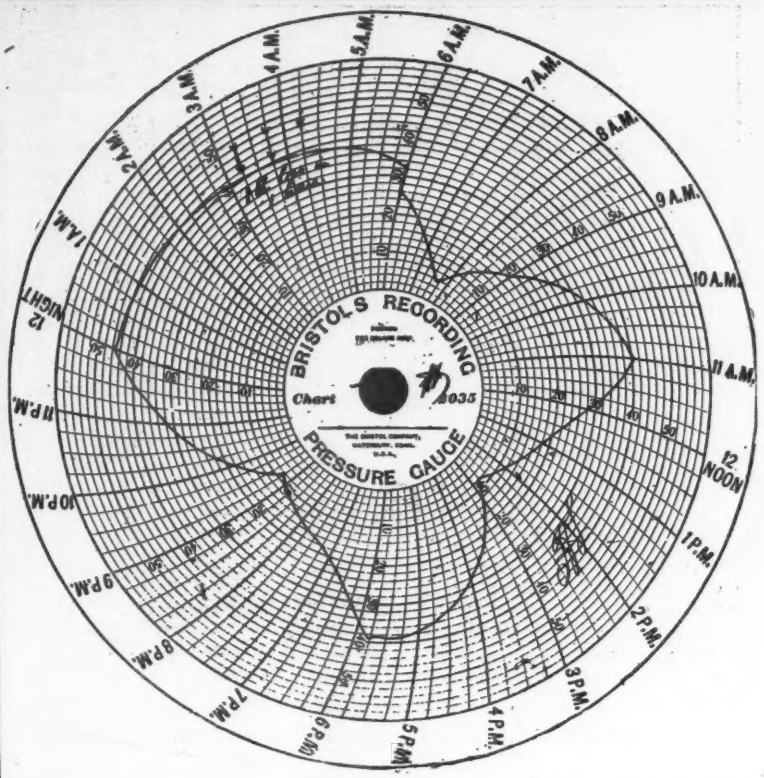
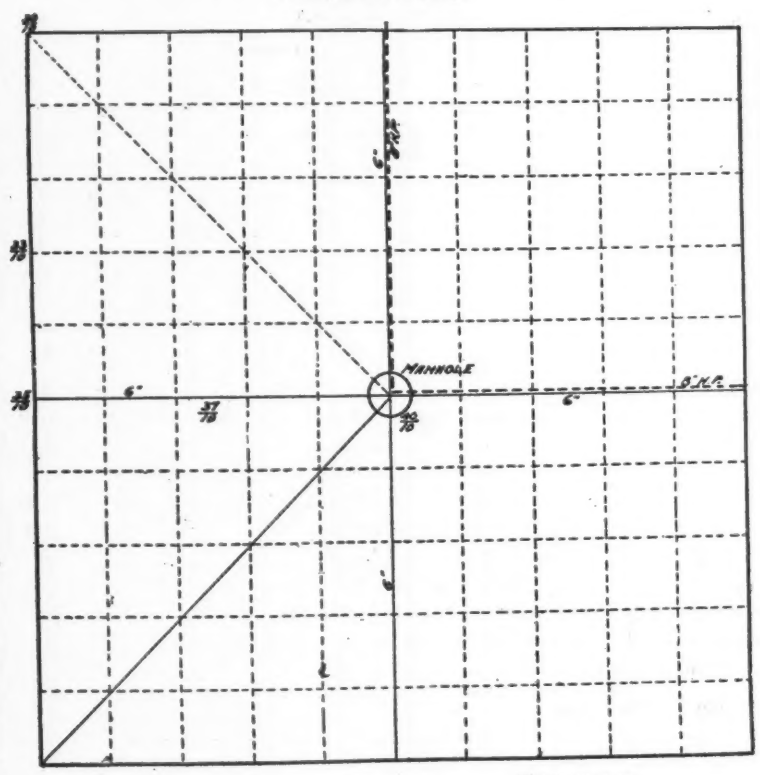


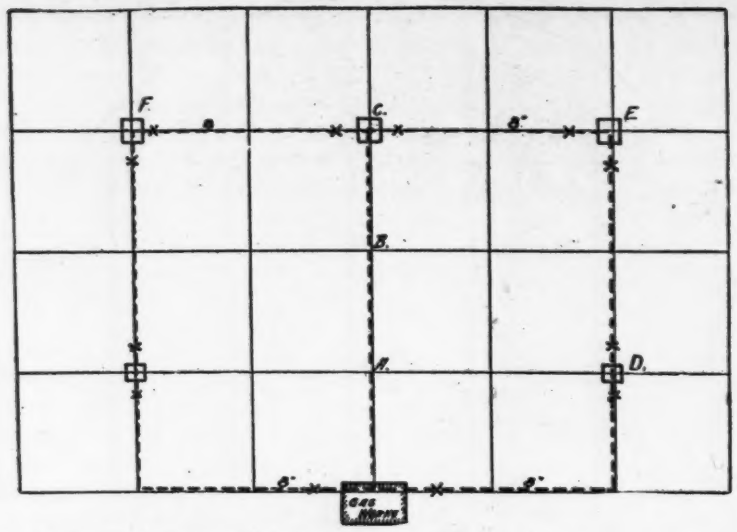
Exhibit I.—Typical Chart, Showing Pressure at Outlet of Compressors of St. Louis County Gas Company.



Plat Showing L. P. and H. P. Mains for Supplying Ideal Square Mile of Town Shown on Exhibit K.

Exhibit J.—Ideal Square Mile for Medium Size Towns.

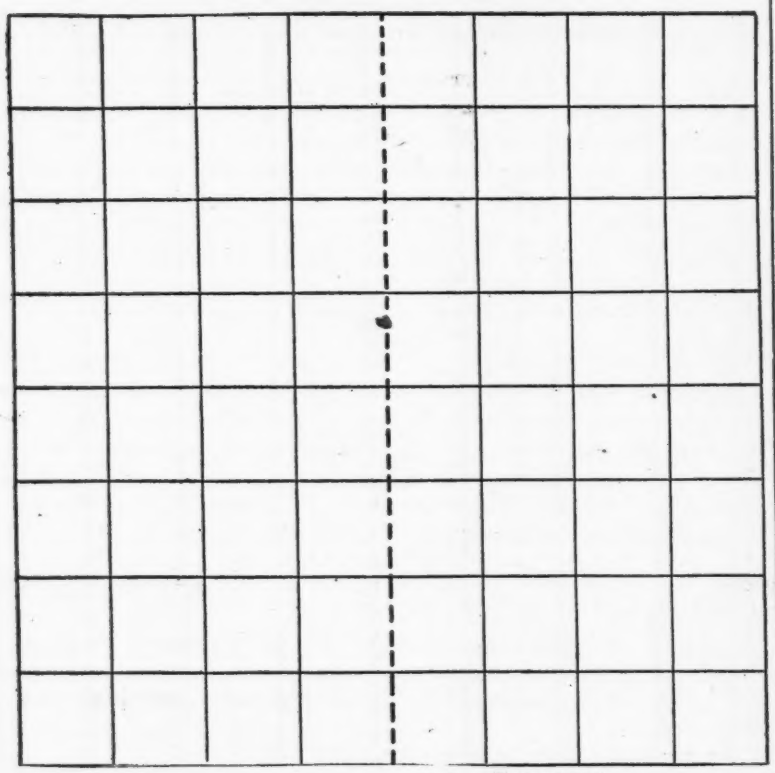
soon as this governor shows a variation on the chart the chances are the valves are cleaned and the governor put in proper condition again, but this cannot be done as thoroughly at the consumer's residence. If a series of charts be placed at random on high pressure mains, the charts will not show as perfect a circle as we have been led to believe. Our own experience in St. Louis county has borne out this fact, and the charts I have received from various sources where high pressure is used tell the same story. As long as the number of consumers is not excessive, as is the case in the majority of communities so supplied, it is possible to be reasonably certain that the pressures are practically uniform, and the governors operating properly; still you cannot be absolutely sure that this is true at any time. I am satisfied that charts taken at random on a low pressure distribution system will show up better than those taken on a high pressure distribution system, both systems being in first-class condition.



H.P. Main System for Ideal City of 40,000 Population Area, 6 Square Miles. In Practice an 8-Inch H.P. might be Laid from Works to C, and Manhole Installed either at A or B and Omitted at C, or a 12-Inch Low Pressure Main Run from Works to C. Depending on Local Conditions.

EXPLANATION.
8-Inch C.I. – – – – – – – – –
6-Inch C.I. L P.———————
All Mains Laid with Cement Joints.
X — Valves.

Exhibit K.—Ideal Belt Line for Medium Size Town.



EXPLANATION.
8-H.P. – – – – – – – – –
All other mains 2-inch W. I.

Map showing system of mains for 1 square mile of ideal city shown on Exhibit K.

Exhibit L.—Ideal Squre Mile, having a 2-inch Wrought Iron Main Distribution System.

FIELD FOR HIGH PRESSURE DISTRIBUTION.

I do not believe it economically practicable to supply strictly high pressure distribution to cities having as many as 40,000 inhabitants, for the reasons mentioned above, namely:

1. Shorter life of wrought iron mains, due to electrolysis and corrosion.
2. Greater danger in case of leakage from the high pressure mains and greater chance of having such leakage develop suddenly.
3. Increased expense of pumping the gas.
4. Increased cost of inspection.
5. The uncertainty existing at all times as to the pressure being carried at any meter.

In order to determine under just what conditions high pressure distribution is advisable, many factors enter into the problem. It is not sufficient to make a decision on the basis of the number of cubic feet sold per mile of main; but consideration must be given to the fact as to whether this gas is sold to a few consumers or to a large number of consumers.

If we let A = the cost of pumping gas, including interest, depreciation and operation.
B = the excess cost of maintenance per consumer per year, with high pressure service over the similar cost for low pressure service.
C = the excess cost of investment of the high pressure service, including governor, seal, etc., over the low pressure service.
D = the average cost of 1 mile of high pressure main.
E = the average cost of 1 mile of cast iron low pressure main.
F = the average number of 1,000 cubic feet per consumer per year.
G = the number of consumers per mile of main.

Assuming interest at 5 per cent.; interest and depreciation on cast iron mains at 6 per cent.; interest and depreciation on wrought iron mains at 10 per cent. Then in order that the advantage of both systems may equal, the following equation must be satisfied:

$$G \times F \times A + G \times B + C / 10 + D / 10 = 6 \times E / 100.$$

Experience in St. Louis indicates that the excess cost of maintenance of high pressure consumer over low pressure consumer is equal to approximately 30 cents per consumer per year. The excess cost of a high pressure service over a low pressure service is approximately $4 per service. Assuming the size of the average high pressure main 1¼-inch diameter to cost $850 per mile, and the average size of low pressure cast iron mains to be somewhat in excess of 4 inches, and to cost $2,250 per mile, we will then have:

$$B = 0.3;\ C = 4.0;\ D = 850;\ E = 2{,}250.$$

Substituting these values in the above equation we have:

$$10 \times G \times F \times A + 3 \times G = 496.$$

The table given on page 1105 gives the value of G, F and A, which will satisfy this equation.

What might be termed a disadvantage of the high pressure distribution is the fact, especially in towns which are growing rapidly, that every additional consumer and every increased consumption per year per consumer, lessens its advantage over low pressure distribution.

The number of consumers and consumption per mile might be such that high pressure distribution would prove the most economical, and yet in 3 years the number of consumers per mile might increase to the point where low pressure would be desirable, and every additional consumer would make it more so. All the various kinds of distribution systems have their values, but the important thing to decide is the proper selection of the distribution system especially fitted for the particular case in hand.

The financial situation, the cost of material and labor at the time the bulk of the work is to be done, the character of the soil, the characteristics of the city or town, the future growth of the city or town, the possibility of expensive pavement being placed on the streets in the near future, and numerous other details, must be carefully considered in addition to the factors mentioned before and used in the table. In adopting unit costs, as found from other installations, care must be taken to make sure that the conditions are comparable. For instance, there are many records of wrought iron mains having been laid at exceptionally small figures. This may largely be due to the fact that long stretches of these mains were laid at one time, and under favorable conditions. After the bulk of these mains have been laid the chances are that the unit cost of laying small stretches of mains under less favorable conditions will be considerably greater than the average results heretofore obtained. Also with respect to the published unit costs of pumping gas. It must be remembered that some of the results published were obtained under exceptionally favorable conditions. The best results will be obtained where the pumping plant is placed at the existing works, with very small additional investment for boilers, ground space, etc., and where the compressors or blowers are attended to with practically no additional force of labor.

In St. Louis county it was necessary to purchase separate real estate, and to erect special buildings for the pumping plant. The machinery consists of the following:

Two 15-horse power Nash gas engines, operating two Smith-Vaile straight line compressors, and one 80-horse power, 2-cylinder, double acting Snow gas engine, direct connected to a 14-inch by 15-inch double acting, Laidlaw-Dunn-Gordon compressor, having a capacity

of 22,500 cubic feet per hour. A vibration holder, station meters, oil filters, cooling towers, etc., are also provided.

A	F	G		
Cost of Pumping Per 1,000 Cubic Feet. Cents.[1]	Cubic feet Gas Used Per Consumer Per Year. Thousands.	Consumers Per Mile of Main.	Sales Per Mile. Thousands.	Number of Feet of Main Per Consumer.
2	15	83	1,245	64
2	20	71	1,420	74
2	25	62	1,550	85
2	30	55	1,650	96
2	35	50	1,750	106
2	40	45	1,800	117
2½	15	73	1,095	72
2½	20	62	1,240	85
2½	25	54	1,350	98
2½	30	47	1,410	112
2½	35	42	1,470	126
2½	40	38	1,520	139
3	15	66	990	80
3	20	55	1,100	96
3	25	47	1,175	112
3	30	41	1,230	129
3	35	37	1,295	143
3	40	33	1,320	160
4	15	55	825	96
4	20	45	900	117
4	25	38	950	139
4	30	33	990	160
4	35	29	1,015	182
4	40	26	1,040	203
5	15	47	705	112
5	20	38	760	139
5	25	32	800	165
5	30	28	840	189
5	35	24	840	220
5	40	22	880	240
6	15	41	615	129
6	20	33	660	160
6	25	28	700	189
6	30	24	720	220
6	35	21	735	251
6	40	18	720	299
7	15	37	555	143
7	20	29	580	182
7	25	24	600	220
7	30	21	630	251
7	35	18	630	299
7	40	16	640	330
8	15	33	495	160
8	20	26	550	203
8	25	22	540	240
8	30	18	540	299
8	35	16	560	330
8	40	14	560	377
9	15	30	450	176
9	20	24	480	220
9	25	19	475	278
9	30	17	510	310
9	35	14	490	377
9	40	13	520	406
10	15	28	420	189
10	20	22	440	240
10	25	18	450	299
10	30	15	450	352
10	35	13	455	406
10	40	12	480	440

Most of the pumping is done by the Snow engine, which is a very economical piece of apparatus, yet for every 1,000 cubic feet of gas pumped the engine uses 45 cubic feet, which at 60 cents per 1,000 amounts to 2.7 cents per 1,000 for gas alone. To this must be added the services of a day engineer, and a night engineer, also the interest, depreciation, general repairs and expense on the whole plant. Under such conditions as these the unit cost of pumping gas is not at all comparable with such results as are obtained by Mr. Shattuck at the plants of the Suburban Gas Company, Chester, Pa.

1. Loss of candle power not considered in above table.

As stated in the beginning of this paper, all the various kinds of distribution systems have their value, but the important thing to decide in the future will be the proper selection of a distribution system especially fitted for the particular case in hand. A careful study must be made, and this can best be done by the experienced gas engineer, and the answers given to the list of questions shown in the appendix will be of great value to anyone contemplating the installation of a high pressure system.

Appendix.

The following list of questions was sent out to a number of prominent engineers throughout the country, and the answers to same are given below:

(1.) What style of pumping or compressing machinery are you using?

(2.) Were you to rebuild your plant, what changes would you make in its installation?

(3.) What is the actual average cost of pumping gas with your present installation?

(4.) What is the loss in actual candle power due to compression?

(5.) What type of district governor are you using, and is this governor perfectly satisfactory?

(6.) What individual consumer's governor are you using, and is this governor perfectly satisfactory?

(7.) What is the average cost of maintenance per year over and above the cost, had low pressure distribution been used instead of high pressure distribution?

(8.) What do you consider the average life of wrought iron mains?

(a.) In the suburban territories?

(b.) In the average size cities of your district?

(9.) Have any serious accidents taken place in your district, owing to high pressure distribution, within the past 8 years?

(10.) Do you consider that there is any greater danger in distributing gas with high pressure than with low pressure, where the population is not dense?

(10a.) Do you consider that there is any greater danger in distributing gas with high pressure than with low pressure in large cities where the population is dense?

(11.) Will you kindly have ten 24-hour charts taken in the high pressure lines, on the consumer's side of the meter, locations to be taken at random?

(12.) Have you had trouble with drips. What was the nature of the trouble?

(13.) Are you having trouble with condensation in your high pressure lines?

(14.) Are you having trouble with electrolysis?

(15.) Do you use wrought iron or steel pipe for your high pressure lines?

(16.) Do you coat your high pressure lines with any particular coating, and if so, kindly describe same?

(17.) Do you consider the capacities of pipes as obtained directly from Cox's Computer (high pressure) sufficiently accurate for practical purposes?

(18.) What is the average cost of laying 1¼-inch, 1½-inch, 2, 4 and 6-inch high pressure pipes?

(19.) Do you provide for expansion?

(20.) Do you use Dresser insulating joints?

(21.) How often do you inspect the service at each individual consumer's residence?

(22.) Is there any effect of the high pressure gas on the diaphragms of your meters?

(23.) Have you had many cases of seals blowing?

I.

(1.) The Laidlaw-Dunn-Gordon Compressors, single and 2-stage, both steam, gas engine and electrically operated.

(2.) The machinery is very satisfactory, and I would not make any changes in the latest installations.

(3.) It would be impossible to give an average cost for pumping, as gas engines are used in some of the country towns, steam compressors in others. In some places large quantities of gas are raised

to pressures under 20 pounds, while in others comparatively smaller quantities are raised to 80 pounds. If it is desired to have an answer to this question, the cost would have to be given in specific cases.

Replying to your letter of June 24th, I am glad to know that the data which I sent to you was satisfactory. In regard to the use of gas for operating gas engines belted to the compressors, I have taken a run of 16 days' operating intermittently and averaging about 20 hours total used per day. One 38-horse power gas engine and one 80-horse power gas engine, the gas registered by meters, these engines working together, used approximately 6 per cent. of the amount of gas compressed, so that I should say that your results of 4 per cent. are extremely good.

(4.) No loss in candle power is experienced, as gas is so treated that its terminal candle power is the same as the initial candle power. For method employed, see paper by E. C. Jones on "Compression of Illuminating Gas," in Volume I., American Gas Institute.

(5.) Chaplin-Fulton governors, which have proven very satisfactory.

(6.) The Equitable governor exclusively. No. 1 is the smallest size used.

(7.) There is no appreciable difference in cost of maintenance over low pressure distribution, excepting the care of moving machinery and the inspection of governors.

(8.) The average life of wrought iron mains depends on the structure of the iron (steel having a shorter life), the amount of protection by a well-proven neutral coating, the character of the soil in which it is laid and freedom from electrolytic action. Wrought iron pipe should average 20 years, although there are service pipes in use in all of our towns that I know have been in the ground for over 30 years.

(9.) No accidents of any kind have happened with our high pressure distribution system.

(10.) Not with proper handling by trained men.

(10a.) I do not consider that there is any greater danger of distributing gas with high pressure if proper precautions are taken.

(11.) ———

(12.) We have had no trouble with drips. A special high pressure drip was used, is shown in an illustration accompanying a paper[1] read by Mr. E. C. Jones, before the Pacific Coast Gas Association, Sept., 1907, entitled "A Recent High Pressure Installation."

(13.) We have had no trouble with condensation on high pressure lines, but there has been some condensation in lines carrying less than 20 pounds pressure. This condensation has been taken care of by blowing the drips.

(14.) There has been no trouble from electrolysis.

(15.) Steel, plain end tubing, using Dresser couplings, and in some cases line pipe with pipe line sockets for medium pressure.

(16.) The pipe is first thoroughly cleaned in a special machine, using sand to remove the rust. It is then coated with a mixture of best red lead and oil, and after it is thoroughly dried it is then given a coat of No. 31 gasholder paint. The theory is that the red lead protects the iron and the gasholder paint protects the red lead.

(17.) I have found Cox's computers safe and conservative, but practical results always exceed the results as obtained by the computer.

In all of our high pressure calculations we use the formula evolved by Mr. Edward A. Rix, as described in his two papers on the "Compression and Transmission of Illuminating Gas."

II.

(1.) We use positive pressure blowers, manufactured by the P. H. & F. M. Roots Company and the Connersville Blower Company, both of Connersville, Ind. Roots' blowers are No. 11 special high pressure, direct connected with a rope coupling to 20 by 24 horizontal engines. The safe maximum speed is about 150 r.p.m. Also, we have two blowers of the Connersville type, No. 9 special high pressure, 22½ c. f. per revolution, direct connected to high pressure Erie engines. These blowers are built to run at 300 r.p.m.

(2.) We would install practically the same outfit; however, we would replace the larger size slow speed with the smaller unit, high speed type, the slippage being considerably less with greater economy.

(3.) In the past few months we have found the average cost of pumping gas to be about $600 per month. This includes repairs to buildings and steam line, supervision, salaries to pressure men and cost of steam. This figures about ¾ cent per 1,000 cubic feet of gas sent out over the high pressure lines.

(4.) We have found no loss due to compression, but some experiments have shown that the candle power at the outlet was slightly higher than that at the inlet. The only reason that I can give is that the water vapor must be thrown out during the compression.

(5.) We use the Chaplin-Fulton double diaphragm, sensitive governor for all sizes above 6 inches. Six inches and less we use the Crawford.

(6.) We are using the Reynolds' house governor which we have found to be entirely satisfactory.

(7.) None.

(8a. and b.) We have no data on the life of wrought iron mains. We are taking up and using over wrought iron mains that were used for natural gas some 15 years ago. They have now been in use for the past 8 years and seem in good condition. Last year we removed some services which had been in use for the past 50 years and were in good condition. They were taken out on account of being too small.

(9.) No.

(10 and 10a.) These two questions need a qualifying answer. We do not distribute gas at a pressure above 5 pounds, and even at that the territory over which this pressure extends is very limited. We have, however, a high pressure Pintsch line running through the heart of the city and carrying, as you know, about 250 pounds pressure. We have never had any trouble with this line.

(11.) But few of our consumers are fed direct from the high pressure lines.

(12.) None.

(13.) None.

(14.) We are having some slight trouble with electrolysis on our low pressure system. We have found that where cast iron pipes with cement joints are properly laid there is no trouble. In the negative areas of the city we have bonded to the negative busbar at the street railway power house.

(15.) We, of course, use wrought iron pipes of extra heavy weight in the Pintsch system. In other systems we used nothing but cast iron pipes with cement joints.

(16.) In laying the Pintsch lines we inclosed them in boxes filled with pitch.

(17.) With large sizes of pipe, yes.

(18.) ———

(19.) We do not provide for expansion in the laying of any of our pipes, except the Pintsch lines running over bridges. In these cases we use long return bends.

(20.) No.

(21.) Only on complaints.

(22.) We do not have any.

(23.) None.

III.

(1.) Duplex steam drived comp ressors, mechanically operated, inlet valve and poppet discharge. Machines are of long stroke and operated slowly. All machinery in duplicate.

(2.) Would have part of machinery gas engine driven.

(3.) The cost items of compressi ng gas are: The cost of the steam required, plus a proportion of the engine room labor, oil, engine room expense and repairs , plus labor to return condensation to the plant, no depreciation. Above items total just under 2 cents. One man per shift does all firing and runs all machinery in engine room on account of favorable location.

(4.) Twelve-candle power water gas enriched to 20-candle power with benzol 1½ candles the maximum with average air temperatures about 50°; 22-candle power water gas, 4½ candles maximum, loss air about 65°; severe cold spells, loss 7 candles; illuminants again easily absorbed at point of expansion if reintroduced.

(5.) Using both Johnson-Reynolds' and Equitable governors, duplicate settings of intermediate regulators and low pressure governors.

(6.) Johnson-Reynolds' and also E. Young's combination governor and meter connection.

(7.) Practically no difference directly traceable to high pressure. The high pressure district more scattered.

(8a.) Thirty years. (b.) Twenty years.

(9.) No.

(10a.) No. (b.) Yes.

(11.) ———

(12.) No.

(13.) Yes. The removal of condensation is an important unsolved problem. See Question No. 25, Bureau of Information, American Gas Institute. We are also having occasional stoppage of service

1. See JOURNAL, Sept. 30, 1907, p. 578.

and curb cocks due to accumulations of "mechanically separated" carbon.

(14.) Yes. Overcoming same temporarily at least by connecting with negative bus bars of trolley company and making the lines continuous circuit.

(15.) Guaranteed full-weight, wrought iron pipe.

(16.) Pipe dipped in Williamson's coating and wrapped with paper.

(17.) Yes.

(18.) One and one-quarter-inch, 12 cents; 1½-inch, 15 cents; 2-inch, 20 cents; 4-inch, 45 cents; 6-inch, 80 cents.

(19.) No.

(20.) Use Dresser couplings, but bond over them Dayton & Hammon.

(21.) Six months to 1 year. Paint service pipe; oil governer diaphragm.

(22.) We find it necessary to make our meters into dipping meters, as the diaphragms which pass high pressure gas have a tendency to become bleached.

(23.) No. Our average is 9 in 100 per year.

IV.

(1.) Roots' high pressure rotary blowers. Directly connected by means of a rope coupling to Atlas high speed engine, operating at 250 r. p. m. maximum and fitted with flywheel governor and diaphragm governor for maintaining constant pressure. Blowers to operate from ½ to 6 pounds pressure.

(2.) We would not, for the same conditions, change the style of this installation.

(3.) No data.

(4.) No data.

(5.) Do not use district governor.

(6.) Reynolds consumers' governors. Work very satisfactorily.

(7.) No data. Not in operation long enough.

(8.) Average life of wrought iron mains in suburban territories and cities of this size and same soil, about 25 years. Uncoated. We have taken up pipe in the ground for 25 years, which looked in well preserved condition.

(9.) Have had no accidents.

(10.) Do not consider there is any greater danger in this style of distribution.

(11.) ————————

(12.) Have had no trouble with drips.

(13.) Have not been operating under real high pressure, so do not know whether we will have condensation. Expect some.

(14.) Practically free from electrolytic trouble.

(15.) Use wrought iron line pipe, with long taper recess coupling.

(16.) Do not use any coating.

(17.) ————————

(18.) Have only laid 2-inch, with 4-foot 6-inch cover, which, including valves and all other appurtenances, runs about 35 cents per foot in this gravel soil, which requires a wide trench at top to keep from caving.

(19.) No special provisions for expansion.

(20.) We use Dresser joints.

(21.) Have made two systematic inspections of consumers' residences in the last year.

(22.) Not noticeable under the pressure we carry.

(23.) Practically no cases of seals blowing on account of low pressure.

V.

(1.) Two single-cylinder, belt-driven Clayton compressors, with mechanically operating inlet valves and poppet discharges. Cylinders 14 inches in diameter by 8-inch stroke.

These compressors are driven by 15-horse power, 3-phase electric motors, current for which is supplied by our own hydro-electric plant.

(2.) Would make no change under our conditions.

(3.) The average energy per 1,000 cubic feet of gas compressed for a period of a year is 3.3 kilowatt hours. You can put any value on the kilowatt hours that you choose. In addition to this some allowance should be made for oil, was e, repairs and attendance. As a matter of fact, there practically have been no repairs up to date.

(4.) We have no means of measuring the drop in candle power, as we have no photometer at the end of the transmission line.

(5.) Reynolds' governor No. 01, of the double district governor type. Has been entirely satisfactory except for a few days of extreme cold weather, when we had slight trouble with frost. This has since been overcome by putting a small electric heater in the governor pit.

(6.) None.

(7.) Not distributing under high pressure.

(8.) Impossible to answer this question. Depends entirely on soil and electrolytic conditions.

(9.) Transmission line is 3 years old; no accidents to date.

(10.) Yes. Do not approve of high pressure distribution.

(10a.) Most decidedly. Have no use for high pressure distribution or transmission in large cities. By high pressure I mean 30 pounds or up.

(11.) Inclosed herewith please find cards for the high and low pressure sides of the governor for a week. We do not keep 24-hour records.

(12.) We use bleeders to take care of the condensation, and have had no trouble except to blow them out.

(13.) Answered in No. 12.

(14.) Pipe has been in the ground only 3 years, and over 1¼ miles of it will have to be renewed this year. The Traction Company has agreed to take care of its return current in such a way that we expect this trouble to be practically eliminated from now on.

(15.) Steel.

(16.) Pipe is thoroughly coated with water gas tar which has been boiled down to make a fairly thick paint. We have been doing this for some years with excellent results.

(17.) Have no means of making a comparison.

(18.) Have not sufficient accurate data.

(19.) Only provision for expansion is where pipe crosses a bridge, and is exposed to a range of temperature varying from minus 35° in the winter to 135° when it is exposed to the hot sun in the summer. In this run across the bridge we use a brass expansion joint with stuffing box.

(20.) We have 2 Dresser insulating joints. We would be much better off without them unless we are going to put in enough to materially increase the resistance of the pipe to electric current.

(21.) No pressure service in use.

(22.) We haven't noticed any bleaching of the diaphragms so far, but anticipate slight trouble from this source.

(23.) Have no seals.

VI.

(1.) Westinghouse.

(2.) None for output which we have.

(3.) We have no means of knowing.

(4.) We have made no tests to determine candle power loss. We should judge, however, that it is not appreciable.

(5.) We use no district governors.

(6.) We use Johnson-Reynolds' governors and they are working in a perfectly satisfactory manner.

(7.) The average cost of maintenance per year is no more with high pressure than with low, the cost for caring for complaints showing a less average cost.

(8.) We have no means of knowing.

(9.) No.

(10.) No. (10a.) Yes.

(12 and 13.) We have but little trouble with our drips. For the first 1,000 feet after leaving the works a considerable amount of condensation. This caused us trouble once, during a long continued period of extremely cold weather. The trouble experienced at this time was upon a steep hill quite near our works, the condensation apparently being held in a finely divided state at this point, gradually freezing, until without warning our supply was cut off. We have since installed a separator of the same type as Cochran's steam separator and think we have solved this difficulty.

(14.) No.

(15.) Wrought iron line pipe.

(16.) We coat our high pressure lines with Hickenlooper formula.

(17.) Yes.

(18.) In sandy and gravelly soil our prices average as follows: 1¼-inch, 16 cents; 1½-inch, 19 cents; 2-inch, 21 cents; 4-inch, 39 cents.

(19.) Expansion joints.

(20.) Yes.

(21.) Once a year.

(22.) We have noticed none.

(23.) Not over 2 or 3 each year.

VII.

(1.) Ingersoll-Rand compressors; duplex, cross compound.

(2.) None that I can think of now.

(3.) Cannot give exact figures.

(4.) Never have assured myself that there was as much as 1 candle in 24-candle gas.

(5.) Equitable Meter Company double-regulator.

(6.) None.

(7.) Our high pressure distribution is altogether a reinforcing system to low pressure distribution.

(8.) Laid bare about 3 to 5 years in this soil; free from electrolysis, will vary greatly according to soil.

(9.) Yes; one misfortune.

(10.) Yes. (10a.) Yes.

(12.) Yes. Condensation passing over into low pressure mains and being taken up by gas which caused stoppages in checks of Welsbach burner.

(13.) Have had no trouble since installing drips.

(14.) Don't know.

(15.) Steel.

(16.) All new lines are being boxed and concreted.

(17.) Don't know.

(18.) Actual cost of installing varying size pipe:

1¼-inch heavy, extra black pipe, boxed and concreted with 1 of cement and 3 of sand, per foot	$.2395
1¼-inch extra heavy black pipe boxed and concreted with 1 of cement and 3 of sand, per foot	0.2645
2-inch extra heavy, double-strength, recess coupling taper-thread boxed and concreted; pipe capable of standing 250 pounds pressure, per foot	0.3954
3-inch line, pipe boxed and concreted to carry 40 pounds pressure, per foot	0.3924
4-inch line pipe boxed and concreted, per foot	0.5296
6-inch line, pipe boxed and concreted, per foot	0.9733

(19.) Yes. Dresser joints occasionally.

(20.) Not for insulating.

(21.) Have none.

(22.) Takes the oil out of the leathers in a few months.

(23.) Have none.

VIII.

(1.) At 3 of our plants we use the Ingersoll-Rand straight line compressors 10 by 13 to 14, but at our largest plant which does most of our pumping, we have an Imperial type 10 duplex compressor, with a capacity of a million feet per day. This compressor is compound steam, and can be used condensing when desired, but we are not as yet using it condensing.

(2.) For our new plant we will probably use this type 10 compressor unless we should decide to use the cheap electrical power of the drainage canal, in which case we would use an electric driven compressor of equally as good mechanism, and would use the type 10, steam driven compressors in our outlying large holder stations doing much pumping, using the cheaper but less economical straight line compressors at the points where little pumping is done. It is the old question of "Interest charge vs. operating charge." Where little gas is to be handled, I take it that only a cheap compressor could possibly be afforded.

(3.) We do not know the cost of pumping gas with our Duplex compressor as it has only recently been installed. With the straight line compressor, the cost is about 4 cents per 1,000, which includes compressor labor, expense and maintenance. The actual figure last year per 1,000 pumped is as follows:

Compressor labor	0.0156
Compressor expense	0.0238
Compressor maintenance	0.0024

Compressor expense, includes steam, oil and waste, etc.

(4.) We cannot answer this, but hope to know more about it within a short time. There is some loss.

(5.) We are using the Johnson-Reynolds' district governor and it gives good satisfaction.

(6.) We are using the Johnson-Reynolds' combined governor and seal and find it satisfactory. You may be interested to hear, however, that we had our first trouble the other day, the diaphragm of one of these governors breaking down completely, as a consequence of which the meter in the house was blown up. The householder, who fortunately turned the gas off without delay, denies having tampered with the seal, but we are still investigating and endeavoring to find out why the blow-off pipe did not take care of the escaping gas. Personally, I am inclined to think that the householder found the gas escaping through the blow-off pipe and endeavored to stop it.

(7.) It is impossible to answer this question, as our high pressure distribution is so new compared with the low pressure and its cost of maintenance is yet very low.

(8.) We have iron and steel pipe in our territory which is good after 50 years' service, and other similar pipe which, even without electrolytic trouble, has not lasted 1 year. I believe in covering and coating pipe, and that the average length of life will depend upon the care and intelligence with which this is done.

(9.) We have had no serious accident.

(10.) No.

(10a.) I think there is an increased hazard. It would be necessary to inspect the more complicated and exposed house installations very frequently, which would reduce the hazard in that respect; but I do not favor high pressure mains under permanent pavements, where there are telephone and other underground conduits, which, in case of a leak, greatly multiply its dangers and the difficulty of finding it.

(13-14.) We have practically no condensation or drip trouble.

(15.) We have some electrolytic trouble, but it is not yet serious with us.

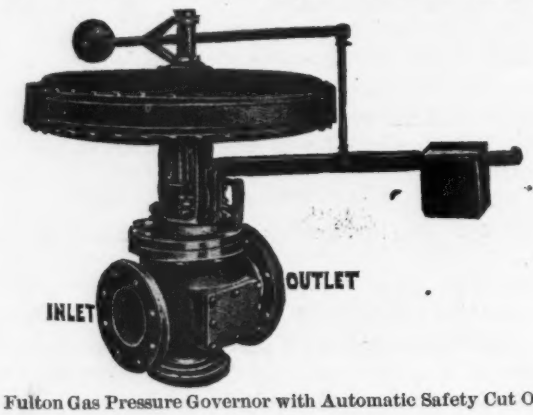
(16.) We use steel pipe.

(17.) We use pyro-coating. The first and second coats are applied hot on hot pipe, and all pipe is touched up after laying.

(18.) The factor used in Cox's computer is 41.3, which I believe is too low. I think the factor 47.5 is safe and more in harmony with such experiments as have been made.

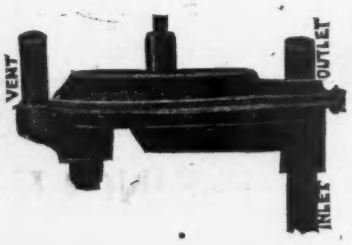
(19.) Our cost of pipe last year is as follows: One-inch, .1134; 1¼-inch, .1383; 2-inch, .1593. We laid no 1¼, 4 or 6-inch high pressure pipe last year. The cost of laying the 1-inch is high in proportion, but it is mainly used on short runs, and the labor cost runs up because no single short runs can be done as cheaply as long jobs.

(20.) We use expansion sleeves on our pipe line every 500 feet, and we use them whenever we use stopcocks in our main system.

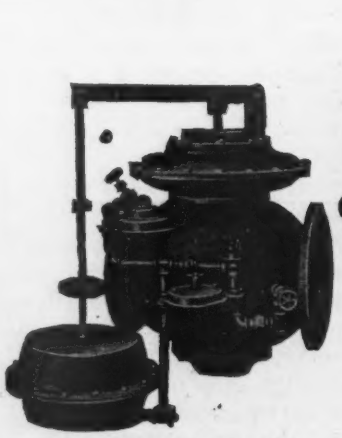


Fulton Gas Pressure Governor with Automatic Safety Cut Off.

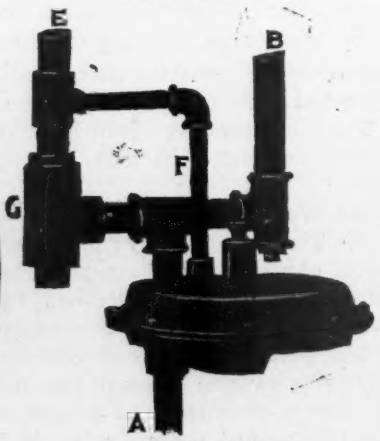
Crawford Sensitive Gas Regulator.



Reynolds Governor and Mercury Seal. (New Style,)



Reynolds Single Horse Power District Governor.



Reynolds Mercury Seal. (Old Style.)

Exhibit M.—Some Types of District and Individual Consumers' Governors.

(21.) We have used a few Dresser insulating joints, but have not

found them satisfactory under our conditions. Throughout our entire high pressure sections, where we cross a street railway track infrequently, we have inclosed our pipe in a trough of pitch to a distance of 10 feet outside of the rails. In this high pressure district we have no electrolytic trouble and think favorably of this method.

(22.) Once a year.

(23.) We have watched for this but have not yet detected it.

(24.) We have a good many cases of seals blowing, but practically none except when our pressure has run up to 50 pounds, which it sometimes does for lack of storage room. I do not think there would be much trouble from this cause in a system where pressures on the distribution system could be maintained fairly constant. I favor, if possible, installing at the entrance of every town a governor, reducing the pressure to a constant 10 pounds in the distribution system of the town, thus allowing the pressure in the transmission system to be carried at any point desired.

Multiple-Reflecting Showwindow Devices and Gas Arcs.

[Prepared for the JOURNAL, by "R."]

Multiple-reflecting, gas lighted showwindow contrivances, for commercial exhibition of wares, are being introduced with considerable success in several parts of the country. These multiple-reflecting devices may be divided in several departments.

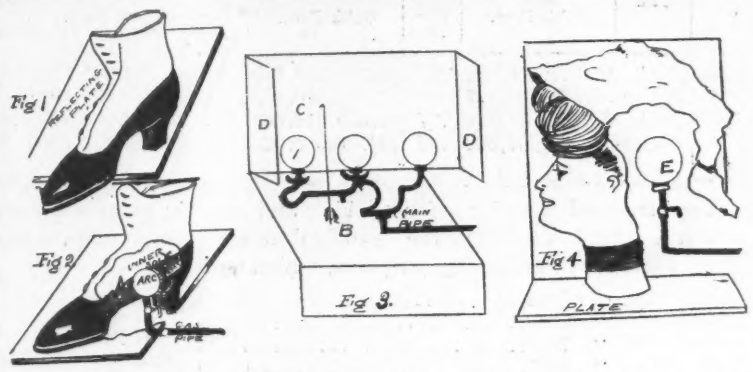
First, the single-reflecting plate, by which the front and the back of the article on exhibition are shown to the customer, while the latter stands in front and is not in position to handle the same, as he might be in the case of a smaller article.

Second, the triple-reflecting arrangement, by which the bottom part of the article may be shown, such as the sole of a shoe, the base of a piece of furniture, the underneath working mechanism of an automobile or kindred device.

Third, the quadruple system of exhibiting, by which reflecting plates are employed to present all sides of the article to the customer. This arrangement of lighting of multiple sides of goods on exhibition on shelves, in show windows, in cases, on counters and at other places, calls for the employment of a system of gas arc and electrical lighting. The writer has given attention to the scheme the past few weeks and has formulated the accompanying drawings to illustrate the same.

Fig.1 shows the common method of putting a shoe on exhibition on a platen of reflecting mirror. The fact that the plate reflects makes it possible to duplicate the sides of the shoe and increases the vision of the observer a little; but this arrangement of articles on exhibition has been in use many years. The new plan calls for something like the adjustment shown in Fig. 2. Here the main supporting and tilted plate is of common glass. An attempt is made to get pure white, or atmosphere-colored glass, so that the glass supporting plate will be as nearly invisible as possible. The plate is itself supported on metal arms at the back, where the arms can be concealed to best advantage. Hence we have a shoe apparently supported in space. Then the gas arc is arranged below the shoe, as at *A*. Sometimes nothing further is done. The shoe supporting-plate is elevated from the floor so that it is possible for persons to see the underneath portion of the shoe. The gas arc and fixtures are finished off in bronze or other acceptable metal color. The plate and arms are neat. Therefore, the observer can get a good idea of the lower construction of the shoe. In case it is desirable that the observer should see other parts of the shoe from the point of vision where he stands, a reflecting mirror is placed below, back or at the sides. With this arrangement all sides of the shoe may be observed. Manufacturers of articles of any kind, who desire that the whole exterior be seen without the article being handled, resort to this plan.

Some of the combination reflecting plate glass cages are quite mystical in arrangement. Sometimes when the gas man is called upon to arrange the lighting facility for certain merchandize showing cases he gets puzzled; but in reality the plan is simple. One can look through any of the books on the black art and get points as to arranging mirrors for deceiving the eye. You can readily make a small show stock of a merchant appear exceedingly large by using some reflecting plates and gas arc lights. Many merchants do not like to put many goods in the show window or show case, for the reason that the goods get off-color and shopworn while there. Hence the fewer goods exhibited the better. With a combination case, as in Fig. 3, one article is made to look like a number of articles. At the same time the patron can examine every side of the article he is interested in. The article is supported in the middle of the set of reflecting plates. The bottom plate *B* reflects up, the back plate *C* forward, and the side plates *D D* inward. Milliners have adopted the back-of-hat exhibiting idea. Fig 4 shows the arrangement. The figure head and hat are



arranged as usual, only that the adjustment of base, side and back plates is arranged as required. In case only the back of the hat need be shown; then the side mirrors are not needed. The gas is adjusted as at *A*.

I have noticed the gas arc light-reflecting idea introduced in automobile show windows. It is an exceedingly interesting sight to stand in front of a show window carrying a motor vehicle in such way that your optical vision is deluded in seeing the underneath workings of the car, and the same running. The plan is not in its perfected stage as yet, and cannot be propounded extensively in this article. It will be taken up later; but the experiments have resulted in presenting to the observer on the sidewalk in front of the show window a modern automobile. The wheels revolve on drums, but the car stands still. By front-stepping a little the observer is astonished to see the entire bottom of the car with all of the gearing running.

The Production of Gas and By-Products in the United States for the Year 1907.

[Abstracted for the JOURNAL, by MR. H. THURSTON OWENS.]

The following statistics have been presented in an advance chapter from mineral resources of the United States, prepared for the Department of the Interior by Prof. Edward W. Parker of the U. S. Geological Survey—necessarily the figures are but a trifle better than approximations.

The number of companies reporting from 1898 to 1907 are given as follows:

Year.	Coal Gas.	Water Gas.	By-Product Recovery Coke Ovens.
1898	433	*	520
1902	533	*	1,663
1903	528	*	1,956
1904	534	*	2,910
1905	529	477	2,998
1907	516	520	3,892

* Not Given.

The reasons given for the decrease in coal gas companies are those due to consolidations, changing from coal to water gas, and shutdowns in small towns which have electric lighting plants.

Sales of Gas.—The total sales of coal and water gas for the years 1905 and 1907, with the increase in per cent., is given as follows:

Year.	Production of Coal Gas.	Production of Water Gas.
1905	40,454,215,132	77,412,024,591
1907	54,819,684,825	94,634,612,730
Increase	35 per cent.	22 per cent.

In addition to the above nearly 8 and 11 billion cubic feet were unaccounted for in the years 1905 and 1907, respectively, as follows:

Year.	Nature of Gas.	Quantity, Cubic Feet.	Per Cent. Total Make.
1905	Coal	3,200,591,905	7.3
1905	Water	5,547,203.913	6.7
1907	Coal	3,422,859,577	5.9
1907	Water	7,505,261,777	7.3

Proportion Sold for Illuminating and Fuel Purposes.—The proportion of gas sold for illuminating and fuel purposes, and the price per 1,000 cubic feet for the years 1905 and 1907, were as follows:

1905–1907.

Year	Nature of Gas.	Illuminating. Cubic Feet.	Illuminating. Price Per 1,000.	Fuel. Cubic Feet.	Fuel. Price Per 1,000	Total. Cubic Feet.	Total. Price Per 1,000.
1905	Coal	26,817,836,022	$.863	13,636,379,110	$.719	40,454,215,132	$.814
"	Water	59,531,804,429	1.005	17,880,220,162	1.017	77,412.024.591	1.008
1907	Coal	30,156,771,756	.77	24,662,913,069	.54	54,819,684,825	.67
"	Water	71,931,606,896	.95	22,703,005,834	.96	94,634,612,730	.95

The increased use of gas for cooking and heating purposes is well illustrated by a showing of the steadily decreasing percentage of sales of *coal gas* for illuminating purposes, which were:

Year 1902	80.45	per cent.
" 1903	75.00	"
" 1904	74.00	"
" 1905	66.00	"
" 1907	55.00	"

Sales of Regular Gas Companies.—As most of the coal gas reported used for fuel purposes is made by the by-product process, the figures as to total production by regular gas companies would read in round figures as follows:

	Illuminating.	Fuel.	Total.
1905	86,300,000,000	21,800,000,000	108,100,000,000
Per cent.	80.7	19.3	
1907	102,000,000,000	26,900,000,000	128,900,000,000
Per cent.	79.1	20.9	

It is, of course, understood that the figures as to the percentage used for illuminating and fuel purposes are only estimates; but, to say the least, they are surprising.

The proportion sold for fuel purposes is generally given as at least double the figure for either year, especially in the large companies.

The most interesting deduction, however, is the increase of over 15 per cent. in the sales for illuminating purposes, and it is to be hoped that some of the calamity howlers who would have us buy their particular panacea will kindly take notice.

Does it look as though gas was losing its position as a first-class illuminant?

By-Product Plants.—The increasing importance of by-product coke plants is evidenced in the figures showing the amount of coal carbonized at gas works and at by-product coke plants. Of the total quantity of coal carbonized at both classes of works, the per cent. used at gas works has steadily decreased since 1903, as follows: 1903, 55 per cent.; 1904, 50 per cent.; 1905, 43 per cent.; 1907, 35 per cent.

The total operations at both kinds of works for the years 1905 and 1907 are given below.

The quantity of gas sold at gas works, per ton of coal carbonized, in 1907, was 8,512 cubic feet, as against 2,750 cubic feet sold as surplus gas at retort oven works per ton of coal.

Value of Gas and By-Products.—The total production of gas, coke, tar and ammonia, and the value thereof at gas works and by-product coke ovens, for the years 1903, '04, '05 and '07, are given below.

In addition to the above the production at water and oil gas works for the years 1905 and 1907 was:

1905.			
Gas sold, cubic feet	77,412,024,591	value,	$78,072,500
Tar, gallons	9,230,411	value,	245,252
1907.			
Gas sold, cubic feet	94,634,612,730	value,	$90,173,112
Tar, gallons	14,414,017	value,	342,041

In addition during 1905, 2,274,891 gallons were produced and unsold. Comparing the figures for 1905 and 1907, for the first mentioned we find that, while the quantity of gas sold for the year 1907 shows an increase of 35 per cent. over the previous year, the value only increased 11 per cent., whereas the quantity of coke increased 41 per cent., and its value 61 per cent., the average price per ton being $3.75 in 1907 and $3.28 in 1905.

Coke.—The production of coke from gas works shows an increase of 10 per cent., whereas the by-product coke shows an increase of 61 per cent. for 1907 over the year 1905. The total quantity and price for the two kinds were as follows:

	1905. Short Tons.	1'07. Short Tons.	Gain.	Per Cent.
By-product	3,462,348	5,583,038	2,120,690	61
Gas house	2,289,030	2,510,106	221,076	10

Average Price, 1907.

By-product	$3.87	per ton.
Gas house	3.48	"
Both	3.75	"

The yield of coke in percentage of coal carbonized figures in the by-product at 75 per cent.; gas house, 62 per cent.

Coal Tar.—The yield, price and value for the years 1905 and 1907 are given as follows:

Year.	Gallons.	Average Price.	Value.	Yield per Ton of Coal.
1905	80,022,043*	2.72	$2,176,944	9.79
1907	103,577,760	2.6	2,651,527	9.04
Increase	29 per cent.		22 per cent.	

* In addition there were 162,165 gallons produced and unsold. there being no market for it.

1905.

Kind of Product.	Gas Works.	By-Product Coke Plants.	Total.
Coal coked short tons	3,558,831	4,628,981	8,187,812
Coal gas produced and sold cubic feet	30,722,278,832	9,731,936,300	40,454,215,132
Coke produced short tons	2,289,030	3,462,348	5,751,378
Tar produced gallons	43,642,189	36,379,854	80,022,043

1907.

Coal coked short tons	4,030,074	7,460,587	11,490,661
Coal gas produced and sold cubic feet	34,302,953,825	20,516,731,000	54,819,684,825
Coke produced short tons	2,510,106	5,583,038	8,093,144
Tar produced gallons	49,581,965	53,995,795	103,577,760

	1903. Quantity.	1903. Value.	1904. Quantity.	1904. Value.
Gas sold cubic feet	31,049,461,511	$30,315,776	34,814,991,273	$32,090,998
Coke short tons	3,941,282	13,634,095	4,716,049	14,693,126
Tar gallons	62,964,393	2,199,969	69,498,085	2,114,421
Ammonia (reduced to NH_3) pounds	17,643,507	1,291,732	19,750,032	1,487,196
Ammonium sulphate pounds	12,400,032	389,028	28,225,510	771,995

	1905. Quantity.	1905. Value.	1907. Quantity.	1907. Value.
Gas sold cubic feet	40,454,215,132	$32,937,456	54,819,684,825	$36,462,304
Coke short tons	5,751,378	18,844,866	8,093,144	30,332,644
Tar gallons	80,022,043	2,176,944	103,577,760	2,651,527
Ammonia (reduced to NH_3) pounds	22,455,857	1,728,254	37,560,858	2,601,057
Ammonium sulphate pounds	38,663,682	997,452	48,882,237	1,525,472

Water Gas Tar.—The production of water gas tar, value and price for the years 1905 and 1907, were:

Year.	Gallons.	Average Price.	Value.
1905.... ...	9,230,411*	2.66	$245,252
1907.....	14,414,017	2.4	342,041

*In addition 2,274,891 gallons were produced and unsold.

Ammonia.—The report states that only about one-fifth of the establishments producing gas and coke from coal report the recovery of ammonia, either in the form of ammoniacal liquor, anhydrous ammonia, or ammonium sulphate.

The total production of anhydrous ammonia and its value for the years 1905 and 1907 were:

Year.	Pounds.	Value.
1905.....	22,455,857	$1,728,254
1907.....	37,560,858	2,601,057

The production of sulphate also showed a marked increase, thus:

Year.	Pounds.	Value.
1905...	38,663,682	$997,452
1907.....	48,882,237	1,525,472

The December Meeting, New York Section, Illuminating Engineering Society.

The meeting of the New York Section of the Illuminating Engineering Society, which was held in the building of the Engineering Societies, December 11th, 1908, was very well attended, as might have been expected, owing to the fact that the speaker of the evening was Dr. C. P. Steinmetz.

When the section chairman, Mr. W. W. Freeman, called the meeting to order, some 75 members were present and, from the attention given the speaker, it may be said that they not only enjoyed, but also profited by the lecture; for such it was, not a cut and dried paper.

Dr. Steinmetz selected the very broad topic of "Illumination and Illuminating Engineering," and treated it in like manner. He stated that the physiological aspects of the subject were much more important than the physical ones, owing principally to the effect upon the eye of both direct and reflected light and the lack of it in many ways. Commenting on "Calculations," he noted that, as far as these were concerned, the importance of using the lumen as the unit of efficiency, as well as flux, was brought out, as, owing to the varying characteristics of our sources, and also because the tube lamps, such as the Moore and Cooper Hewitt, have no candle power values which are of any importance. Besides, the lumen has a definite relation to the intensity on the illuminated plane; or, in other words, the flux density.

Although we may determine accurately by means of illuminometers the value in foot candles or flux density, this physical quantity will not be of great value unless we have fulfilled the physiological requirements.

That there are many factors in illumination problems which bear directly upon the use of our eyes was very forcibly presented by the speaker. For instance. High intrinsic brilliancy will lower the visual sensibility, even though the lamps are not directly in the field of vision; either too high or too low flux density causes considerable strain. Complete uniformity is also undesirable as the eye will have no oportunity to rest. On the other hand, the change from high to low intensity must be within comparatively small limits, for although the eye can with stand great changes in this respect they must not be rapid ones. We can see fairly well at night under a full moon, when the flux density will be but a fraction of 1 foot candle, and also under full sunlight at noon, when the flux density will be several thousand times that amount, but we cannot go from a dim room into clear sunlight without decided eye strains.

As far as "color" was concerned, Dr. Steinmetz did not refer to the effect of ultra-violet rays, but it is obvious that this troublesome feature will be eliminated when shades were used which cut down the intrinsic brilliancy. When light sources of various colors are desired this can be accomplished by means of colored shades, in which connection he called attention to the fact that color differences vary rapidly under various intensities.

Probably the most interesting feature of the lecture was the importance, clearly shown, of the use of "shadows," and it would seem as if the crux of the matter was in the success with which this feature was carried out. In very few cases no shadows are desirable, a draughting board being one of them; but in the majority of cases we need shadows without sharp edges, and this could be accomplished by means of a combination of diffused and direct lighting. In domestic lighting the diffusion could usually be obtained by means of reflection from walls and ceilings. The fact that we require at least some of the light within the line of vision could be readily demonstrated by a visit to an auditorium, where only indirect lighting is employed. Dr. Steinmetz summarized the defects in our present systems as follows:

1. Improper combinations of high and low flux density.
2. Sources of high intrinsic brilliancy in the field of vision.
3. Improper combinations of direct and indirect lighting.
4. Not enough shadows.
5. Shadows with very sharp edges.

He seemed to think that many of the difficulties could be overcome if we studied the effects of daylight in the various rooms of a house, as we would then have a useful guide for installations of domestic lighting.

Street Lighting.—Dr. Steinmetz stated that uniform intensity was the chief desideratum, but on account of economy it would necessarily have to be of low intensity. In order to obtain these results the light source, if placed within 20 feet of the ground, should give its maximum intensity about 10° below the horizontal, and to be as near white as possible in color, owing to the poor reflection from roads and buildings. The objection to this method was that shadows from an object are very long and, therefore, objectionable, as the appearance of the object is distorted. Another objection is that a source such as he described would be of too high intrinsic brilliancy, and if diffusing globes were used the light near the horizontal would be considerably reduced. Therefore, the solution of the matter was to place the lamps 40 or 50 feet high and use enough of them to obtain uniform illumination.

In answer to a question he stated that the system in Detroit had not been successful, as it was altogether too pretentious and not enough lamps had been used. In answer to the many criticisms which have been made of the lighting in this country as compared with that in Europe, he stated that the conditions here are entirely different, citing as an example the fact that the city of Schenectady, with only 70,000 population, covers the same area as the city in Germany where he was born, which has a population of 450,000.

Dr. Steinmetz called attention to the fact that, although we could not afford to light our streets by placing the units very high, as suggested, we could afford to do it in exposition work, and he hoped that general illumination would be provided in this manner at one of the expositions to be held in the future.

Autogenous Welding by the Oxy-Acetylene Flame.

In a paper on this subject read last month by Mr. Eugene Bournonville, before the Technology Club, of Syracuse, N. Y., the author noted:

Autogenous welding is the uniting by fusion of metals of the same nature at high temperature without the intervention of a different metal as is done in soldering or brazing. This welding is accomplished by means of a blow pipe, known as the oxy-acetylene torch. The high temperature of the oxy-acetylene flame was discovered by Le Chatelier in 1895. In a note to the Academy of Sciences he presented his calculations, showing that with an equal volume of oxygen acetylene would give a temperature of about 4,000° C., or 7,200° F.. which is 1,000° C. or 1,800° F. greater than the temperature of the oxy-hydrogen flame.

The first experiments were greatly impeded by flash back caused by rapid propagation of the flame, and it was not until 1901 that a practical torch was obtained. This torch was developed by Fouche and Picard, both engineers of the French Company, Acetylene Dissous, and their success was due largely to the use of compressed acetylene, but even then they had to carburet the acetylene with gasoline, and still better results were obtained when the acetylene was mixed with ether to prevent the flame flashing back. This apparatus was shown by Edmond Fouche at the Société des Anciens Eleves des Ecoles des Arts et Metiers, November 3, 1901, then to the French Society of Physics, December 6, 1901. On March 2, 1902, Fouche exhibited a high pressure torch to the Professional Syndicate of the Academy, using only pure acetylene mixed with oxygen. It was not until near the close of 1903 that Fouche was able to construct what is known as the low pressure torch.

Since the disclosure of Le Chatelier and the inventions of Fouche and Picard, many attempts have been made to improve upon their designs. The greatest success appears to have been attained by the invention of Camille Rodrigue-Ely and Emile Gauthier of the firm

of A. Boas, Rodrigues & Co., Paris, France, the United States patents on which were purchased by the Davis-Bournonville Company.

So far as is known the first oxy-acetylene torch to be used in the United States was sent to the writer by Fouche while he was still experimenting, and with this torch he was successful in welding copper and steel without the use of any flux.

There are three distinct types of oxy-acetylene torches: High, low and medium pressure. The high pressure torch can be used only with both the acetylene and oxygen under pressure, and the apparatus must be provided with positive check valves to prevent the gas of one container going into the other, in case the tip of the torch becomes obstructed by molten metal or otherwise. Because of flash backs in these high pressure torches they have become so heated in several instances that portions of the torch have been melted. Another defect of the high pressure torch is that both the gases being under very high pressure they issue from the tip with great force and it requires an expert to make a weld without blowing away the molten metal. The advantage of the high pressure torch is that both gases being under pressure the operator has perfect control of the mixture for the flame, being able to add to or reduce the volume of either gas as required to obtain a perfect flame.

The low pressure torch is used with the oxygen under pressure, while the acetylene is taken from an ordinary lighting generator in which the pressure is slight. In this torch the gas is mixed by injection, the acetylene being drawn from a surrounding chamber into the mixing chamber by the velocity of the oxygen passing through it. As there is no means in this torch to force the acetylene the operator must depend entirely upon injection to secure the mixture. As the proper mixture is 1 part of acetylene to 1.28 parts of oxygen, and the mixture by the injector being uncertain, a perfect flame is difficult to obtain, and almost invariably there is too much oxygen and the weld is oxidized.

The medium pressure torch was devised to remedy so far as is possible the defects of the other two types. This torch is constructed very much on the style of the low pressure torch except that the mixing of the gases is accomplished entirely in the nozzle or tip. This arrangement enables the operator, by simply changing the tip of the torch, to change the whole combination and to obtain the flame best adapted for the thickness of the metal to be welded, without changing the torch itself. An advantage which this torch has over the high pressure torch is that the mixing chamber and the aperture through the torch tip are about six times larger than the injector through which the oxygen is introduced at 15 pounds pressure, and consequently the blowing force of the flame is not half that of the same size high pressure torch. In case of flash back the flame cannot extend beyond the injector tip, therefore, there is no injurious effect on the torch itself. The advantage over the low pressure torch, in addition to changing the size of the flame without changing the torch, is that this torch does not depend upon the injector for the proper mixing of acetylene, but both gases being under medium pressure the flame can be adjusted exactly to requirements. The flow of gas for a low pressure torch to give a stable flame must have a velocity of not less than 328 feet per second. For the reasons stated the medium pressure torch is the ideal one for autogenous welding and the field for its application in metal working is almost unlimited.

The following table converted from metric to English measures from the *Bulletin Technologique*, September, 1907, will be found of value in making comparisons of the various gases which can be used in autogenous welding:

	Oxygen and Acetylene.	Oxygen and Hydrogen.	Oxygen and Coal Gas.
B.T.U. obtained by complete combustion of 1 cubic foot of gas	1,572	292	618
Cubic feet of pure oxygen theoretically required for the perfect combustion of 1 cubic foot of gas	2.51	0.62	0.923
Cubic feet of oxygen required for 1 cubic foot of gas to obtain the best welding flame (from practical test made)	1.3	0.25	0.67
Cubic feet of gases required to obtain 1,000 B.T.U. with a welding torch.	Acetylene 0.594 Oxygen 0.773	Hydrogen 3.428 Oxygen 0.857	Gas 1.62 Oxygen 1.08

PRELIMINARY steps looking to the incorporation of the Wormleysburg (Pa.) Gas Company, have been taken by Messrs. G. S. Benfer and W. S. Bomberger, of Harrisburg, and George B. Mater, of Camps Hill. The initiatory capitalization is $5,000.

Bureau of Information, The American Gas Institute.

BUREAU OF INFORMATION,
THE AMERICAN GAS INSTITUTE,
HEADQUARTERS, 716 LOCUST STREET, ST. LOUIS, MO.
W. A. BAEHR, Chairman.

The following question was received by last year's Bureau, but as the nature of the question required considerable experimental work, the answer was delayed. The experimental work is not completed.

Question No. 10.—"Can the Bureau of Information inform me if there is any particular kind of anthracite broken coal particularly adapted for water gas manufacture? If so, from what region or vein is this coal mined?"

We here repeat the following questions, which remained unanswered last year:[1]

Question No. 25.—"What rule and method should be followed in designing condensers to remove condensation resulting from compression of gases?"

Question No. 29.—"Does very rapid condensation tend to reduce the permanent illuminating power of coal gas? Experience shows that the illuminating power of coal gas, when condensed very slowly, is considerably higher at the works than when the gas is condensed very rapidly. In the latter case, however, there is apparently much greater loss of illuminating power in distribution, especially in cold weather, due to the condensation of the heavier hydrocarbons. It is evident that it is possible to install gas condensing apparatus costing less than half what the approved apparatus costs, but in which the work would be done very rapidly and also very efficiently so far as the use of cooling water is concerned. Would the use of such apparatus result in appreciable loss of illuminating power at the consumers' burners as compared with the use of the present approved types of apparatus?"

Question No. 36.—"What is the mean spherical candle power of the standard candle? Is there any objection to taking readings of candle power at the angles used for determining mean spherical candle power instead of every 10° or 15° as customary at present. It would greatly simplify the present method of determining M.S.C.P."

Question No. 37.—"Will the Bureau of Information furnish me with the analysis of the firebrick that is considered of good quality for checkerbrick work in carburetter and superheater?"

Question No. 38.—"We have a greenhouse man here who is very anxious to heat his greenhouse with our 23-candle power water gas, using it in a Boynton furnace. We are advising against it, but he says he will not object to paying up to $800 for the season. The greenhouse is exceedingly well built, mostly of glass, with 5,500 feet of radiation, which keeps it amply warm with soft coal. The furnace is No. 191, as shown on page 40 of their 1905 catalogue. We would expect to put him on at about an 80-cent rate. What is your opinion? Should we come anywhere near $800 for the season? Are there any installations in use where artificial gas is used in hot water and steam residence work?"

Question No. 40.—"Does any apparatus exist by which ordinary illuminating gas can be used in connection with the 'Prest-o-lite tanks for furnishing illumination for automobiles?"

Question No. 41.—"What is the difference in the number of candles of light obtainable from a gallon of kerosene oil, as used in coal oil lamps, for illuminating purposes, and 100 cubic feet of 18-candle power gas?"

Recent new questions received by the Bureau are as follows:

Question No. 42.—"Is it good practice for a small plant to test meters by taking a new meter just from the factory, inserting it just after the meter of same size to be tested and allowing consumer to use 2,000 to 3,000 feet with the 2 meters in series, keeping an accurate record of the readings at beginning and end of test period?"

Question No. 43.—"Should a vent pipe be used on all small water heaters such as the Lawson No. 1, in all cases. This heater is used to heat range boilers with the pressure on coil in heater and tank alike?"

Question No. 44.—"Do you know of any good formulas for manufacturing a paint out of pure coal tar for iron or steel? Also, can you give any information as to whether a tar paint is injurious for the above metals? Will you also designate whether any of the components of the paint formulas are intended to neutralize any acids which may be in the paint?"

Question No. 45.—a. "What is the ultimate analysis of the gas oils used in the different parts of the country?

b. "What is the percentage of the paraffine and benzine series compounds in the gas oils used in this country?"

1. The Bureau's year ends the third Tuesday of October in each year.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, December 10th, 1908.

Street Lighting in the City of London.—Increased Educational Facilities.—Municipal Trading.—Business and the Weather.

Wandering in the principal streets of the metropolis, at any time between dusk and 11 P.M., and noticing the methods of lighting recently adopted, one cannot but be struck with the fact that energetic endeavors are being made to remove the reproach, so well deserved for many years, that London is the worst lighted metropolis in Europe. Only 30 years ago, it will be remembered, the ideas of the authorities responsible for this important department did not soar beyond 4 feet or 5 feet batwing burners. The question then was not so much as regards efficiency, but how to keep down expenditure. Not only in London, but all over the country, ideas have undergone a very great change. A degree of lighting that in 1878 would have been ridiculed as absolute wastefulness, is to-day regarded as a necessity. It was not until the use of the incandescent gas burner for public lighting purposes became practicable that efficient lighting was available at a cost within reasonable limits. But since that time there is no excuse for any district, within reach of a gas works, not being well and efficiently lighted at night. If anyone has any new device, either in lanterns or burners, there is no difficulty in securing a practical trial for it, as there is a general desire to have the latest and best appliances.

Your readers may possibly be aware that at the Franco-British Exhibition at Shepherds Bush there was a practical illustration of modern methods of gas lighting as applied for outdoor purposes, in the lighting of a large proportion of the very extensive grounds. The Keith inverted 1,500-candle lamp was largely used, and attracted great attention, not only as showing that a single mantle can be made to compete in candle power with electric arc lamps which have hitherto claimed to be the sole representative of any center giving over 1,000 candles illuminating power, but also on account of the very low consumption of gas, which is stated to be 25 cubic feet and is equivalent to a cost of only three-fourths of a penny per hour. The duty is 60 candles per cubic feet of gas consumed per hour, or about three times that afforded by an ordinary incandescent burner, and high pressure is required to insure such a high result. The gas must be supplied at a pressure of 50 or 60 inches, which look rather formidable as compared with usual distribution pressures, but is a very small matter to the mechanical engineer, who is accustomed to deal with pounds per square inch. Sixty inches of water is equivalent to less than 3 pounds per square inch, which he looks upon as a very low pressure.

There is already a good show of high pressure lighting in the important thoroughfares of Kingsway and Aldwyth, and this is now to be extended the whole length of Fleet street. A special high pressure main is laid along the center of the thoroughfare, and the compressing plant already in use, being situated near one end of Fleet street, can be conveniently extended to include the new addition. The installation is being carried on by the Gas Light and Coke Company, and the compressing plant is being arranged with a view to future extensions. Its dimensions are such as to afford an object of more than passing interest, because it is probably the forerunner of compressing plant on a very substantial scale. From the figures above quoted it may be expected that the application of high pressure is not going to be limited to public lighting. The additional plant will comprise two Keith Blackman rotary compressors, each capable of dealing with 8,000 to 1,000 cubic feet of gas at 60 inches pressure, driven by two National gas engines of 5½-horse power each. The Fleet street installation comprises 16 lamps, averaging 40 yards apart, diagonal measure, of which 13 will be carried on brackets attached to buildings, the light being 4½ feet out from the wall, and 3 on columns. People with aesthetic tastes often cavil at London's ugly lanterns and columns, and not without reason. But the new brackets and lanterns are of elegant pattern that will be an ornament in any street, and the fittings for the columns correspond. The average height of each light from the ground level will be 16 feet, and the lighting and extinguishing will be controlled from the central station by means of an automatic apparatus on each lamp, actuated by the increase of pressure to the normal working rate, or by the reduction of the same.

In connection with the fuel and gas engineering department at the University of Leeds, arrangements have been made for the delivery of special courses of lectures, open to all persons engaged in the industries concerned. A series of 14 lectures on the manufacture of coal gas, including carburetted water gas, will be delivered by Dr. Colman. Mr. Walter Hole, the chief distributing engineer of the corporation of Leeds, will be responsible for 6 lectures on the distribution of gas, and Mr. Ernest Bury will give 6 lectures on by-product coke processes. It will be noted that a distinct line is drawn between gas manufacture and gas distribution. Another interesting novelty is that in fixing the hours for the lectures the convenience of students actually holding appointments in gas works has been considered. One lecture will be delivered on Wednesday evening at 6 P.M. and another on Thursday morning at 9 A.M.; so that anyone within say an hour's railway journey of Leeds, by arranging for accommodation in the city for the Wednesday night, can arrange to attend two lectures by leaving early Wednesday afternoon and coming in late Thursday morning. The University authorities are prepared to make arrangements for a limited number at a fixed inclusive charge, and also to give assistance by furnishing lists of approved lodging houses. I think this is the first step in aid of the numerous class engaged in small country gas works, and who have long looked with a hungry eye on the educational facilities available in towns like Manchester, Birmingham, Nottingham or Bristol. They have been able, in some instances, if the distance was not many miles, to attend the evening classes, but their convenience was not considered in fixing the times. The facilities now offered enable any young man living within a radius of about 40 miles from Leeds to attend the lectures, and the outlay need not be great. The whole cost, including rail and lodgings, need not exceed £5, and no doubt if sufficient support was forthcoming, the railway companies would agree to some reduction on ordinary passenger fares. It need hardly be said that the gas undertakings concerned would offer every possible encouragement to those of their employees who wished to attend the lectures. There is no reason why similar arrangements should not be made in other parts of the country.

There are not wanting signs of the difficulties inherent to local authorities, when they step out of their legitimate function to engage in trading enterprise. So long as the operation taken in hand is a practical monopoly the situation is not particularly strained, but directly it gets outside these limits, and requires to be encouraged and developed in the manner usual with such undertakings, trouble is sure to arise. At Leeds the existence of a municipal works' department is strongly objected to, and it has been agreed that, whenever practicable, constructive or repairing work shall be let out by contract. It was urged that work carried out by direct labor was not carefully set out before hand and always led to unnecessary expenditure, and that it was an interference with private trading. This point is the gist of the whole matter. A water supply may be conducted without bringing up the red rag of competition with the private trader The same might be said about a gas undertaking run on the old lines, where the business ceases at the inlet of the meter. But the corporation gas work owners, in view of the facilities offered by private companies, in the way of supplying apparatus on hire or at cost price, undertaking supply and fixing of gas fittings, maintenance of incandescent burners, or slot agreement schemes, find themselves compelled to come into line, and directly they do so are met with the cry of interference. In the course of discussion at Leeds one member said he had been sent to the Council because business people feared they were going to be ruined by the extension of municipal trading. It was a matter that affected 20,000 to 30,000 shopkeepers. If subject to such competition they would be unable to pay the rates and the city must suffer. At Birmingham the operations of the corporation gas department are hampered in a similar way. The question has been heard of at Edinburgh, and many other instances might be quoted. So long as things are humming and times are brisk it may pass unnoticed; but directly they are slack and people begin to look round for something to keep the workshops running at full time it is sure to attract attention. The moral is, the municipal authorities should keep clear of trading enterprise. Various specious excuses, such as public convenience or public benefit, have been urged in its favor, but I fail to see that it can offer any advantage over properly regulated private enterprise.

The weather since Michaelmas has been very clear and open. The absence of the usual cold, fog and cloudy days which have led November to be regarded as the most melancholy month of the year, has had its effect on the demand both for gas and coke, and everywhere one meets complaints of diminished output of gas and of growing coke heaps. Last week was somewhat of an exception, as 2 or 3

days' fog were experienced, with the usual result that gas was found to be the only practicable substitute for daylight in our large cities, and the inability of electric light to penetrate through a few yards of foggy atmosphere was again demonstrated. As in previous years, the absence of any frost or cold to speak of before Christmas has a disastrous effect on the gas fire trade. There are no rises in the price of coal, which are one of the best advertisements of gaseous fuel. Many householders, on rushing off to the coal office on a cold morning, after a spell of frost and snow, are greatly annoyed to be asked perhaps 20 per cent. advance on the current prices for the last 6 months, and do not fail to appreciate the fact that gas remains the same price all the year round. And directly the shortest day has passed, people fancy they are half through the winter, and having got on so far can tide over for another year. But the experience of the last few years is that December 21st is about the beginning, rather than the middle of winter. Some gas companies are again repeating the mistake of offering surplus coke at get-it-away prices, which will have the usual effect of weakening the trade for the whole season. If a gas company finds that a neighboring coal merchant has a large heap of coke obtained at a ridiculously cheap rate from some large concern perhaps 50 miles away, there is no choice but to be very cautious about their own selling prices. Several instances would be cited where a merchant has bought a large parcel of coke, carried it 50 miles or more by rail, unloaded it into his own yard, and then been able to make a handsome profit by underselling the local maker.

Items of Interest
FROM VARIOUS LOCALITIES.

THE Williamsport (Pa.) Gas Company has closed a contract with the United Gas Improvement Company, of Philadelphia, for a new water gas machine, 7 feet 6 inches diameter, which is to be installed, ready for operation, within the next 70 days. The Williamsport folks have also purchased from the U. G. I. Company a tar extractor and blast-steam meters, to be used in connection with the present 7 feet 6 inches machines installed in 1905. The new set is to replace the small 5-foot machine, which has become altogether too small to be relied upon as a sufficient reserve unit. When this new apparatus is completed the Williamsport Company will have one of the most modern gas plants in the State.

THE Public Service Corporation, of New Jersey, has announced that from the first prox. the net rate in its Plainfield division will be $1 per 1,000 cubic feet. The bills will be made in gross at $1.10.

THE municipal gas plant at Juneau, Wis., which we believe was of the acetylene type, was badly damaged by an explosion, that occurred some evenings ago.

THE authorities of New Haven, Conn., have completed the assessing of the various real and personal properties in that city, the valuations to form the basis for taxation for the ensuing year. The New Haven Gas Light Company heads the list, the valuation for its possessions having been $3,087,280.

A CORRESPONDENT in Haverhill, Mass., writing under date of the 17th inst., forwards this mention: "A new trial has been practically ordered by Judge De Courcey, in the case of the estate of Miss Corinne Wickner, of the Bradford district, against the Haverhill Gas Light Company, in which a verdict was handed down for $5,000 by the jury in the Superior Civil Court, at Lawrence, the 23d ult. The Court has notified the plaintiff that unless all in excess of $3,000 is remitted within 15 days from the 27th inst., that a new trial will be ordered. This is in effect a reduction of the verdict. The case arose out of the death of Miss Wickner, a domestic in the residence of Charles H. Ellis, through asphyxiation. The plaintiff showed that at the time of the accident Miss Wickner was engaged to be married and was making preparations for the wedding. At the time the Haverhill Gas Company was making certain repairs near where the deceased resided, and that as the result of these alterations the gas in the Ellis home had become unreliable and defective, and its imperfectious culminated in the death of the domestic. She was found unconscious in her bedroom and was carried to the Hale Hospital where she lingered 2 days. The defense made a general denial, and in his argument, Attorney Winn for the Company, maintained that if the defect in the gas adjustment existed in the house that the defendant was not responsible."

THE Jenkintown and Cheltenham Gas Company recently brought off a most successful housewarming of its new offices in the Wyncote district, in Pennsylvania, which housewarming went to the extent of the working days between the 1st and 12th insts. During that period demonstrations of how to use gas in the kitchen were afternoon affairs, aided by like demonstrations during the evenings of Tuesday, Wednesday and Thursday. Adding to the interest therein was a competition, the purport and nature of which are best shown by the following extract from the cards of invitation: "The Gas Consumers' Problem. Ten Dollars in Gold for Its Solution—A gas meter will be on exhibition during the reception, showing its operation as it measures the gas used by 5 'Junior' lamps while they burn. The meter locked by a committee selected from those in attendance at 8:30 P.M., December 1st, the dial sealed, the burners lighted and allowed to continue until 8:30 P.M., December 10th, when they will be turned off, the seal broken and a statement taken of quantity of gas consumed. The person who files the answer closest to the total quantity of gas used will be awarded the $10 in gold." This attracted much attention. About everybody in Wyncote visited the offices during the show, and the results, in orders for gas appliances, of one kind or another, of which a splendid display was made, rather proved that the deviser of the housewarming was up to its possibilities as an advertising plan. To crown it all, the Company announced that, beginning January 1st, 1909, the gross rate would be put at $1.40 per 1,000 cubic feet, prompt payment (within 10 days) to bring into play a discount of 10 cents per 1,000. The Company charges a minimum rate of 50 cents per month., and gas used through coin meters is served at $1.30 per 1,000. Of course, this latter service is not hampered through any minimum bill arrangement.

AT a meeting of the Committee on Street Lighting, City Council of Watertown, N. Y., held some time ago, the Selectmen subsequently csnsidered favorably a report made by the Committee in respect to the offer made on public lighting account by the Newton and Watertown Gas Light Company. The general trend of the proposition was to increase the volume of light supplied to public lamps in the sum of 20 per cent., and guarantees that the increased volume would be maintained at a reduction of $1,000 or so per annum in the cost to the city thereof, provided the authorities would give to the contract a life of 10 years. It was further agreed that the charge for electric current supplied on private account would be reduced to 12 cents per kilowatt-hour, instead of the heretofore charge of 18 cents.

THE Derby (Conn.) Gas Company has filed a certificate with the Secretary of State announcing its purpose to authorize an increase of $500,000 in its capital stock. Its present capital is $500,000.

MR. WALTER S. SPEAR, for some time Engineer-in-Charge of the Long Island Development of the New York Board of Water Supply, has been appointed Chief Engineer, Department of Water Supply, Gas and Electricity, for the Borough of Brooklyn. He assumed his duties yesterday. The appointee, who is in his 31st year, is a graduate of the Massachusetts "Tech.," Class of 1897, and his early practical training was gained in connection with important developments in the work of the Metropolitan Water Works, of Massachusetts.

IN the final shift at Martinsburg, W. Va., appears the new Martinsburg and Charleston Gas and Water Company, which has been incorporated by Messrs. W. P. Huston, Jno. H. Blyo and Wm. Goodwin. The concern is capitalized in $300,000.

DESPITE the fact that the natural controlling factor in the situation, at least as far as quality of service and surety of same are concerned, is the nearby Meriden Gas Company, certain speculators of Southington "and elsewhere" are again moving to secure a charter for the gas supply of Southington. It is further certain that the residents of Southington are anxious "to have gas in their midst."

THE "cold process" gasoline plant installed some time ago on public account for the lighting of Marcus, Ia., was destroyed by fire some days ago. Our informant adds: "It is doubtful if it will be rebuilt, as it was not a paying investment in operation."

THE Directors of the Cincinnati Gas and Electric Company have declared the regular quarterly dividend, payable January 1st. This

time the dividend payment is $1\frac{3}{5}$ per cent., in covsonance with the terms of the lease.

ON January 1st the selling rate at Marysville, Cal., will be $1.50 per 1,000 cubic feet, instead of $2, as at present.

"W. G.," writing from New Britain under date of the 9th inst., says: "The residents of Plainville are much pleased over the fair certainty that the Bristol and Plainville Gas Company will extend its mains to their district. At any rate that concern will apply to the Legislature for an amendment to its charter, permitting it to transact business in Plainville in accordance with terms under which its business in Bristol is being transacted."

MRS. HELEN ARMSTRONG, writing to us from Chicago under date of the 19th inst., says: In the issue of the JOURNAL dated the 14th inst., the statement is made that Mrs. Helen Armstrong is on the regular business staff of the Peoples Gas Light Company, of Chicago. So far as my experience goes one of the most certain symptoms of employment is the regular coming to hand of the salary which goes with it. As I am not at present drawing anything of that nature, from my good friends as mentioned, I think I may safely say that the diagnosis is incorrect, and that at this writing I am "foot loose and fancy free. Will you kindly make this correction for me in order that my future interests be not jeopardized?" Thank you, most heartily, for the generous notice which you gave of my convention talk.

SOME time ago we noted that Mr. A. J. Stahl, of La Porte, Ind., was about to make important additions to his plant there. Naturally enough one would believe from this that the betterments were to be made at La Porte. While Mr. Stahl resides in La Porte he controls and directs the gas property at Belvidere, Ills. There is where the prospective work is to be done. Meanwhile, any betterments that are to be undertaken at La Porte will be ordered by Messrs. Child, Hulswit & Co., of Grand Rapids, Mich., which go-ahead concern owns the La Porte property mentioned. So is rendered that which belongs to Cæsar.

"THE Plymouth (Mass.) Gas Company is considering the advisability of constructing an additional storage holder, which inciting to thought was caused by the fact that one 24-hour period this month witnessed an output of gas on the town from a 25,000 capacity vessel that aggregated 38,000 cubic feet. What will they do at all, when the snow begins to fall?—M. M. C."

MR. ALBERT VEGKLE, who, as his name would seem to indicate, is of German extraction, occupies a very responsible position in the manufacturing division of the Boston Consolidated Gas Company; furthermore, Mr. Vegkle, dispite his name, is deservedly popular with his men, who respect him, because he is fair to them while exacting from them proper service to the Company. He plays no favorites, and if there ever is a doubt as to whether or not the offender or man on the carpet is guilty, the man on the carpet is given the benefit of the doubt. Some time ago one of his men, while on duty in Vegkle's office, heard him complain that his bookcase was not what it should be. The hearer spoke to some of his fellow workmen about it, and in the end about 50 of them 'clubbed,' with the following result: Mr. V. is quite of the home sort, wherefore it was not hard to locate him properly, and about 8 P.M., of the 13th inst., while cosily seated in his home, No. 14 Cranston street, Jamaica Plain, he was surprised to hear the tramp of many feet on the steps of his mansion. Listening to the colloquy that ensued between the maid and the men, on the opening of the door, Mr. V. walked out into the hall. Sure enough the callers were for the 'boss,' the delegation being headed by athletic John J. McDonough, flanked by dapper George Stowell. Behind the leaders stood the remainders. The 'bunch' was finally gotten into quarters, and the 'boss' was told in strident tones, emitted by Mr. McDonough, that if he would look a bit further ahead he might see something that would be of use to him. He looked, and there was a handsome combination bookcase. The recipient did not almost weep, or do anything of that sort; for when Mr. McDonough, seconded by Mr. Stowell, had completed their presentation remarks, Mr. V. accepted the gift in a speech that was replete with witty appreciation. Then followed a most enjoyable evening of speech and song and music—you notice, I write 'song and music'—and an excellent series of character-impersonations by Messrs. Willis, O'Connor and Cassidy, respectively. The host did the rest, and did it like the man he is.—M. M. C."

ON the 15th inst.. the House of Representatives, while discussing measures relevant to the administration of the District of Columbia, passed the bill which seeks to put the net selling rate for gas in the District at 85 cents per 1,000 cubic feet.

AT a meeting of the Directors of the Cincinnati Gas and Electric Light Company Mr. Lee H. Brooks was elected a Director, vice Mr. Charles P. Taft. Mr. M. M. White handed in his resignation, but this was not acted upon.

BY-AND-BY the Redlands (Cal.) Home Gas and Electric Company will have accumulated a capital seemingly at least enough to carry on business in that locality. We are led to so believe from the fact that it has been determined to increase its capital stock from $200,000, as at present, to $500,000.

MR. DANIEL P. BULL, for quite some time, through his family ties, interested in the Newport (R. I.) Gas Light Company, died in the Hotel Plaza, N. Y., the night of the 18th inst. He was a cousin of the famous surgeon (Dr. William T. Bull) now suffering from cancer in this city.

ADVICES from Saginaw, Mich., under date of the 19th inst., are as follows: "The differences between the authorities of Saginaw and the Saginaw City Gas Company, which have been in the courts for some time, have been amicably settled through the passage by City Councils of an ordinance granting the Company a franchise for 30 years, and fixing the rates that may be charged. According to the agreement the gas rate is to be put at 95 cents per 1,000 from January 1, 1909, to June 1, 1911, then 90 cents per 1,000 until June, 1921. At that period, the price is to be readjusted after a prescribed method and manner of arbitration. These terms are virtually those that the proprietors of the Company offered the city prior to the beginning of litigation 2 years ago—in fact, the difference does not amount to 3 per cent."

MESSRS. BARTLETT, HAYWARD & Co. have been awarded the contract for the construction of an additional storage holder by the Springfield (Mass.) Gas Light Company, to replace the one that was destroyed last summer during the continuance of a severe electrical storm. Its rated capacity is put at 400,000 cubic feet.

THE Pittsfield (Mass.) Coal Gas Company will also construct a holder this season of the relief type, and rated to store 60,000 cubic feet.

THE new water gas plant for the Rome (N. Y.) Gas, Electric Light and Power Company was started up successfully last week. The plant is up to a make of 500,000 cubic feet per diem, which capacity may not be reached for some time. Nevertheless it is up to the shrewd business policy of Mr. James T. Lynn to be rather ahead than behind in available plant capacity, especially so when prices for construction work are well under the average.

WE are indebted to "M. M. C.," writing under date of the 21st inst., for the following from a recent issue of the Springfield (Mass.) *Republican:* "Mr. Charles N. Nutting has handed in his resignation as Superintendent of the Chicopee Gas Company, to take effect the 1st proximo. Mr. Nutting retires from the service of the Gas Company to accept a more lucrative position with the Weber Gas Engine Company, of Kansas City, as its New England representative. Although he will travel extensively he will retain his local residence for the present. His successor has not been announced. Mr. Nutting took service with the Chicopee Gas Company in 1904. When he took hold there the output was less than 6,000,000 cubic feet, $\frac{3}{4}$ of which was taken by the Dwight Manufacturing Company. The sale now amounts to 50,000,000, and the Dwight people use none of it, since they manufacture their own light. This increase has been made despite competition that has come from the introduction of electricity so extensively, and regardless of the competition furnished by the municipal electric light plant, as government utilities are usually favored by the public more than private corporations. Superintendent Nutting was born in Aleppo, Syria, the son of an American missionary, who had been sent there by the American Board of Foreign Missions, his father having been formerly a practicing physician in Chicopee. The son attended the public schools of Chicopee, completing his education in the State Normal School at Randolph, Va. He returned later to Chicopee to assume the management of the concern, and has spent 30 years of his life there. He was County Commissioner for 3 years, being defeated in the last campaign for re-election, though he carried his own city by a good lead. He is Worshipful Master of the Chicopee Lodge of Masons, the highest office in the lodge, and is a member of the United Workmen."

MR. J. F. SPRINGFIELD, of New York, has been appointed General Manager of the Hutchinson (Kas.) Water, Light and Gas Company, succeeding Mr. W. A. Bixby, who served as an emergency manager on the abrupt severance by Mr. W. E. Hutchinson of such relations with it. Mr. Bixby returns to Springfield, Mo., at which point he will have active charge of the lighting and street railway properties thereof.

The Market for Gas Securities.

There is not much difference in the quotations of this week with those of last. Consolidated opened to-day (Thursday) at 162⅛ and 162¼. The trading in it has been rather on the small scale this week. Of course, everybody just now is waiting for the handing down of the decision.

Brooklyn Union is steady, even strong, at 145 to 148. The increase in the output ratio of the neighboring borough is little short of remarkable. The Hebrews in the past fortnight or so have been selling Peoples, of Chicago, and it pleases us to add that the diamond market will not be unduly affected by their profits on the short side so far. To-day Peoples was just above par and 5. Washington gas is 350 to 356. It will be 400 bid before March 1st, with the high end not then reached.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

DECEMBER 28.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated Gas Co.	$78,177,000	100	162	162¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	130	160
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	103½	104
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	86	91
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	145	148
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	299,650	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	1½	1⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	89¼	8⅝¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	—	—	74½	75
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	—	100
Preferred	2,500,000	100	60	90
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	55½	56
Preferred	25,000,000	100	86½	87
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105	105¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	92	—
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	—
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	103	—
Washington (D. C.) Gas Co.	2,600,000	20	350	351½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Dec. 9, 1908.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Jan. 15th, 1909, to stockholders of record at the close of business, Dec. 31, 1908. Checks will be mailed.

1749-5 LEWIS LILLIE, Treasurer.

Position Wanted

As Superintendent or Manager of Gas or Electric Light Plant, or Both.

Graduate of Cornell University in mechanical and electrical engineering. Actively employed in combination company since 1903. References from leading engineers and managers and others familiar with my work and results. Open for employment after Jan. 1, 1909.

1749-tf Address, "A. B. C.," care this Journal.

Position Wanted

As Manager or Superintendent,

By competent gas man, 35 years of age, married, strictly sober, with operating experience both as manager and superintendent in actual charge of plants. A man who can show and give results; 17 years' experience; now acting as manager of coal gas plant in city of 15,000. Will have to give present people 60 days' notice. Address,

1727-eot-tf "RESULTS," care this Journal.

WANTED,

By a young man, position as superintendent or foreman of coal and water gas plant. Twelve years' experience. Employed. Can give best of references. Can rebuild coal and water gas plants.

1751-2 Address, "C. W.," care this Journal.

Situation Wanted.

GAS SOLICITOR,

Now employed, wants opening with up-to-date company. Strong on electric power competition.

Address, "E. A. C.,"

1751-1 Care this Journal.

WANTED,

Permanent Position as Retort Setter.

Years of experience with American and English firms on horizontal and inclined benches.

1751-1 Address, "H. F.," care this Journal.

WANTED, A BROADER OPPORTUNITY.

I am a heavy stockholder and manager, with excellent record, of one of the best, 675-consumer water gas plants in the Middle-West. Also, recently designed complete plant and supervised construction of works in city of 8,000, which is acknowledged by all, including one of the best gas engineers in the United States, as best plant of its class in this section. I enjoy the complete confidence of my associates, and have entire business and technical management of my company. Am married; am 30 years old, and began at the bottom. I want an interest and management of company in a city of 20,000 to 40,000, where results are desired and appreciated.

1748-4 Address, "ENGINEER," care this Journal.

WANTED,

By one of the largest stove manufacturers in this country, a first-class gas stove salesman, who has acquaintance among gas companies and some knowledge of manufacture of gas. Only live, first-class men need apply. Address, "H. L.,"

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1751-2 Address, "Y.," care this Journal.

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Must be in good condition.

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THE FERY RADIATION PYROMETER IN USE.

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View in the Meter Room of the North Shore Gas Co.,

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In September, 1908, a second Rotary Meter of 45,000 cubic feet capacity per hour was installed.

These meters are shown in the above illustration.

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One-half the cost—One-tenth the space of old style wet meters.

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BY PRODUCT MACHINERY,
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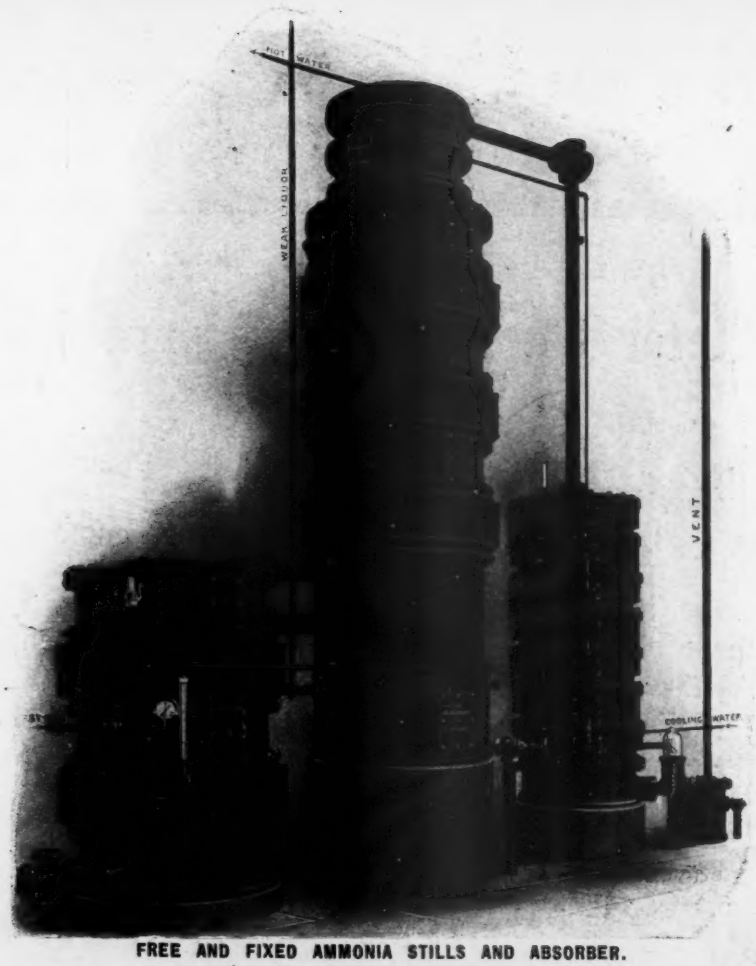

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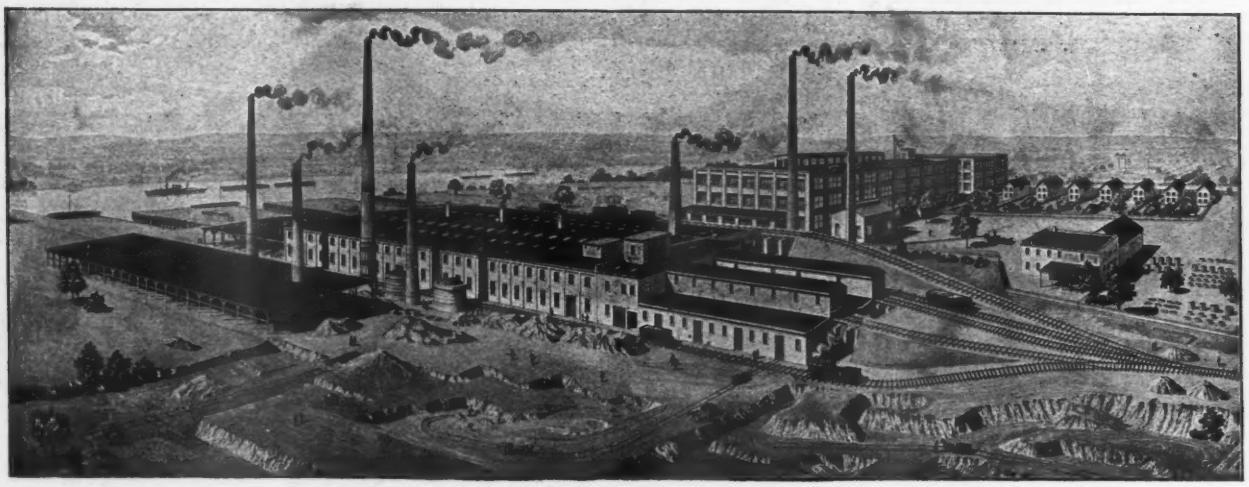

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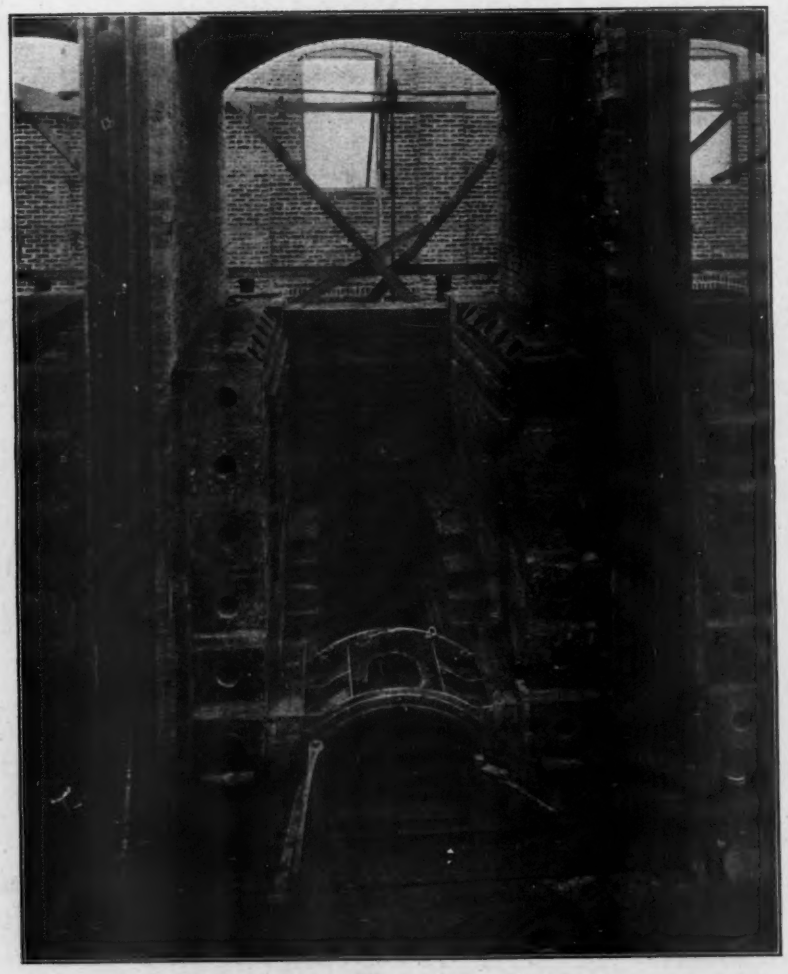

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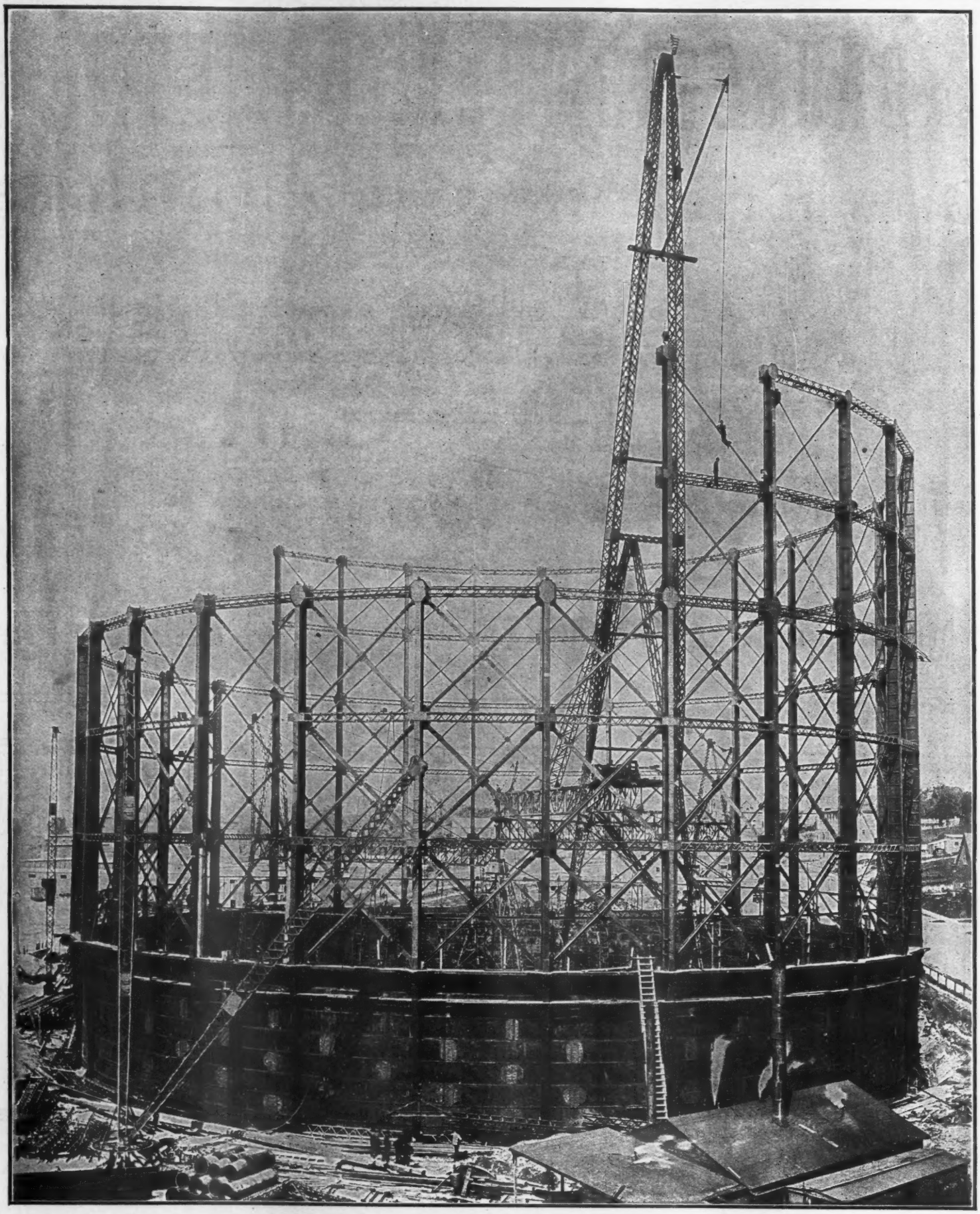

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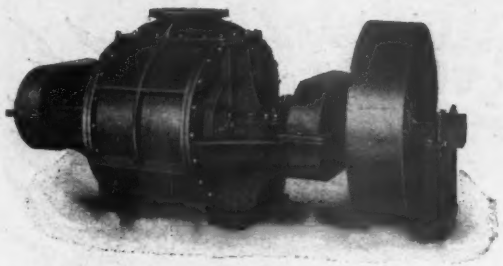

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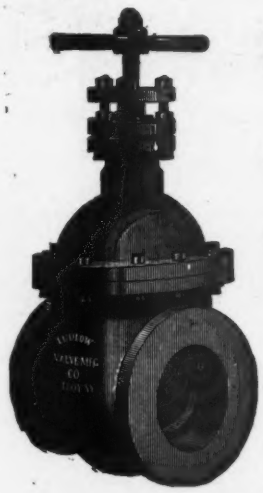
HOT GAS VALVES A SPECIALTY.

Send for Catalogue.



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GEORGE QUINTARD PALMER, Treas. & General Mgr.
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Plans and Estimates Furnished for Extension of Gas Plants or Construction of New Works.

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ETC.,

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SOME OF THE ADVANTAGES.

MORE GAS PER TON OF COAL.

NO BACK PRESSURE on Retorts.

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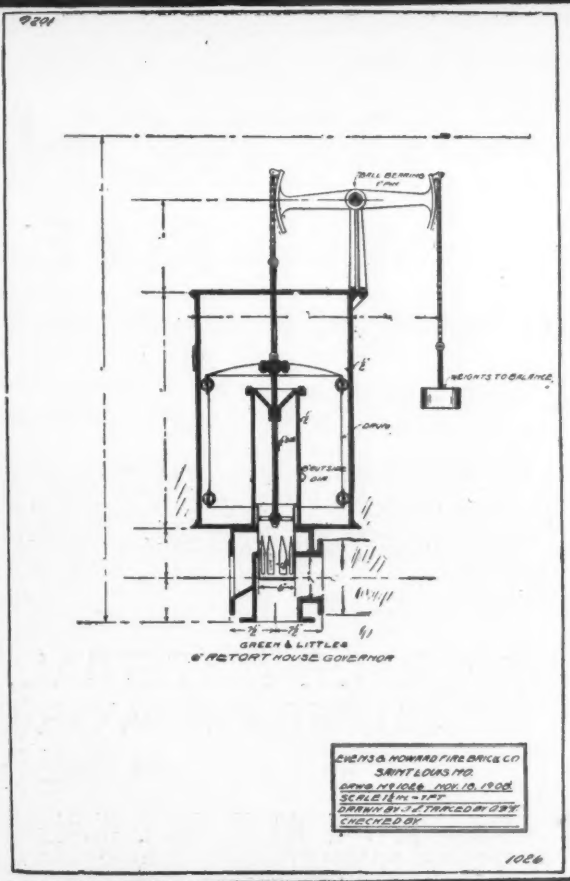
REGULAR Illuminating Quality.

Even with unskilled or green men in the retort house one regular quality of gas is made. There is no risk of pulling in air or forcing gas back through the retort into the settings. Seal on dip pipe can be reduced to ⅛ of an inch.



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DETAILS AND PRICES ON APPLICATION.

SEVERAL ON ORDER.

COST IS LOW.

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By GEORGE LUNGE, PH.D. Third and Enlarged Edition.

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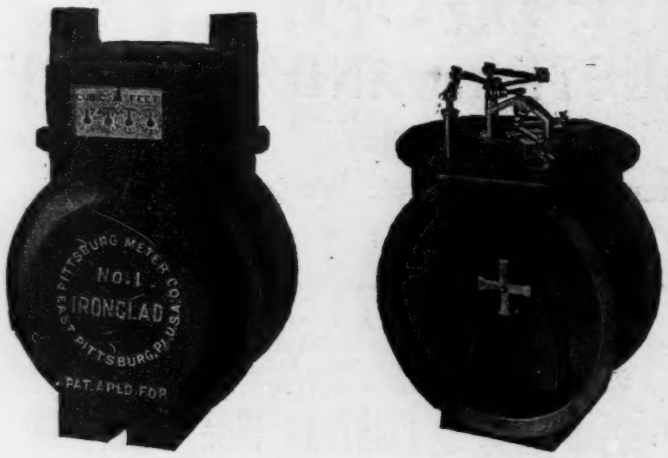


"Ironclad" Dry Gas Meter
With Cast-Iron Case.

¶ Capacity with $\frac{3}{10}$-inch absorption, 120 cubic feet per hour; with $\frac{5}{10}$-inch absorption, 170 cubic feet per hour.

¶ Has all the advantages of tin meters, with addition of cast-iron case.

¶ Will not rust. Has no soldered seams to part.

See Catalogue G-1 for particulars.

Pittsburg Meter Co.

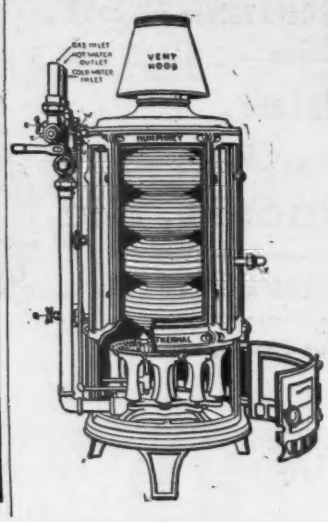
New York Office, 149 Broadway. **East Pittsburg, Pa.**

Manufacturers of Large Capacity and Ordinary Capacity Meters, Prepayment Meters, Proportional Meters and Meter Provers.

LLOYD CONSTRUCTION COMPANY

GAS APPARATUS.

DETROIT – MICHIGAN



Humphrey Auto-Thermal Instantaneous Water Heaters

Have every known desirable feature helping to efficiency, economy, durability and absolute safety.

FULLY GUARANTEED.
PRICES LOW.
QUALITY AND SERVICE HIGH.

Will you help us sell them?

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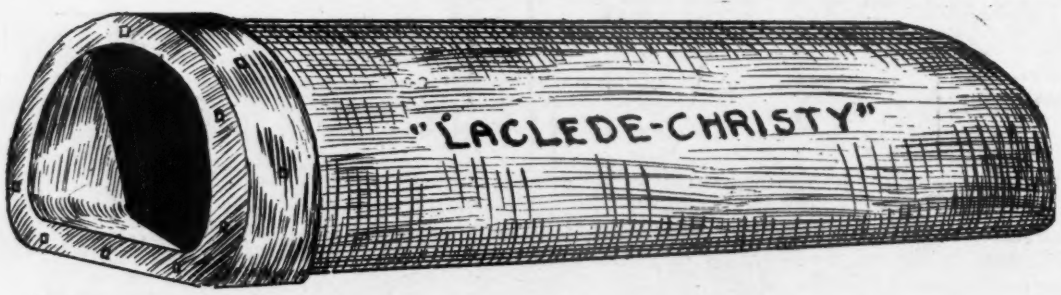

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DESIGNS AND SPECIFICATIONS FURNISHED ON THE HORIZONTAL, INCLINED OR VERTICAL RETORT SYSTEMS FOR COMPLETE GAS WORKS.

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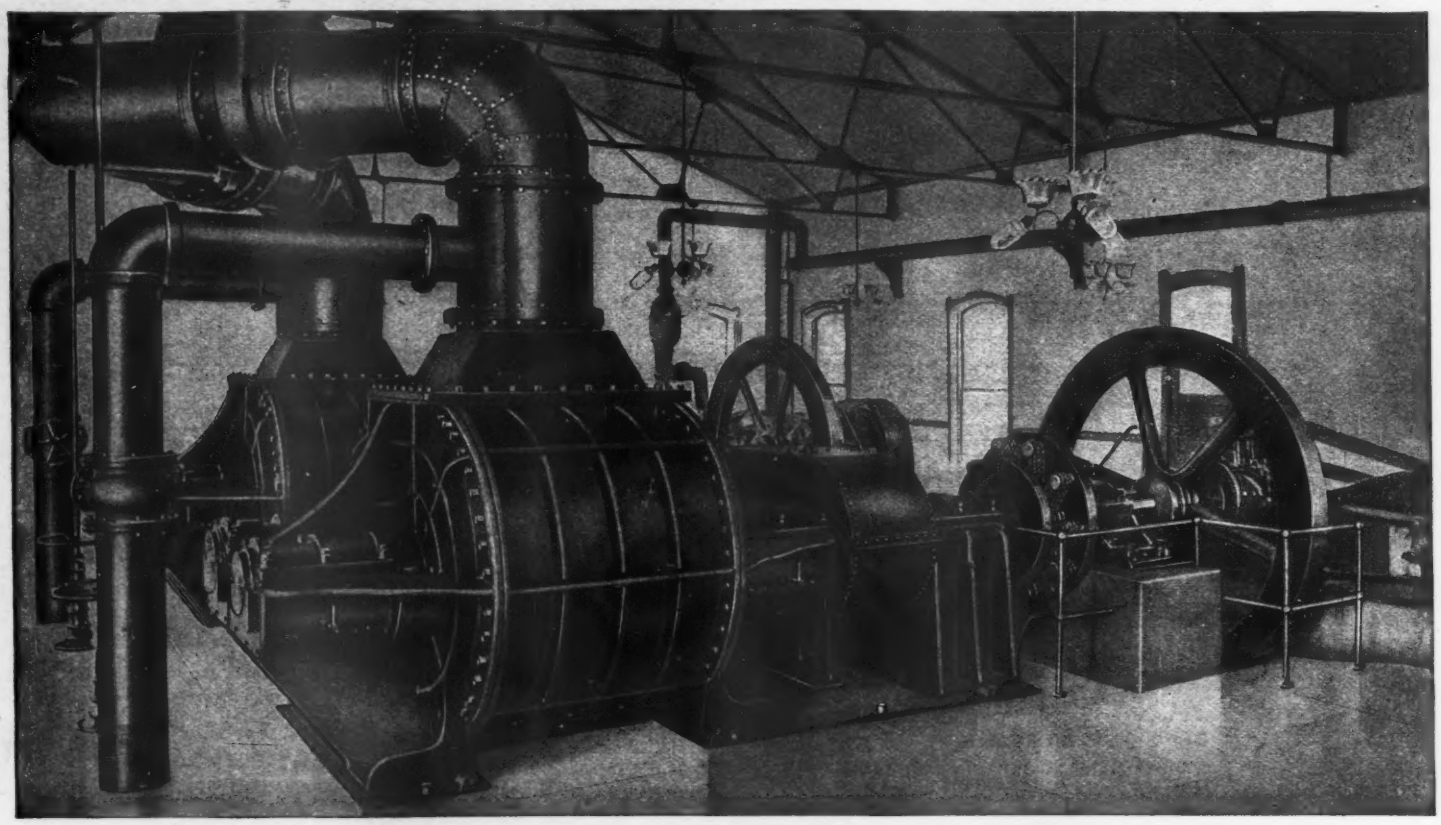
An installation of two units, each handling 800,000 cubic feet per hour, under 5 pounds per square inch, installed for the Peoples Gas Light and Coke Company, Chicago, Ills.



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Are not made in haphazard, guesswork fashion, but after carefully designed patterns based on the experience and suggestions of practical gas plant superintendents and engineers.

Every tool will be found up to the Mueller Standard in quality and is UNCONDITIONALLY GUARANTEED.

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Stand Pipe Reamer.

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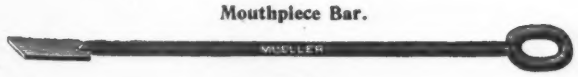
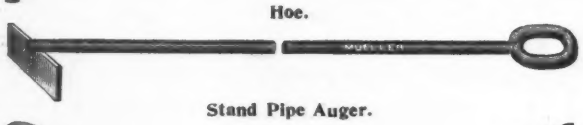
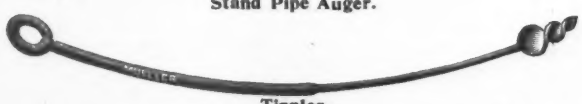


Hook.

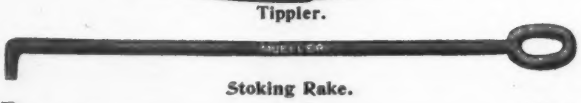
Hoe.



Stand Pipe Auger.



Tippler.



Stoking Rake.

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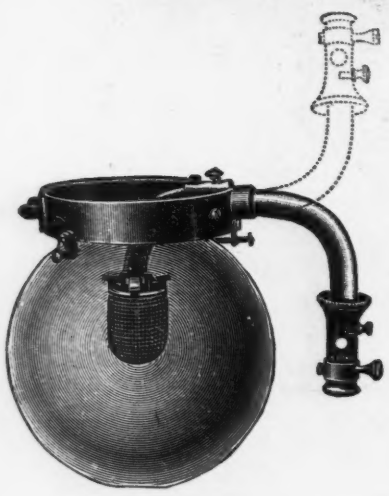
Coke Rake Head.

BRAY INVERTED BURNERS

WERE THE SENSATION OF THE CHICAGO SHOW.



With the gas pressure at 8-10ths and with other burners flashing and carbonizing,

THE BRAY INVERTED

filled the mantle perfectly and without a single flash back.

If you were at Chicago you know this to be a fact.

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ORDER SAMPLES. YOU CAN SEND THEM BACK IF YOU WISH.

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MANUFACTURERS OF

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Manufacturers of

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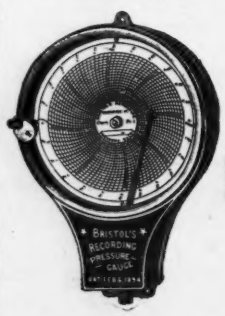

RECORDING PRESSURE GAUGES,
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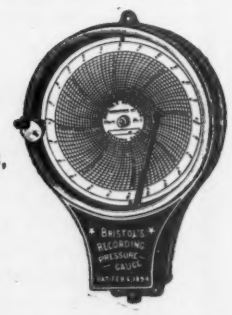
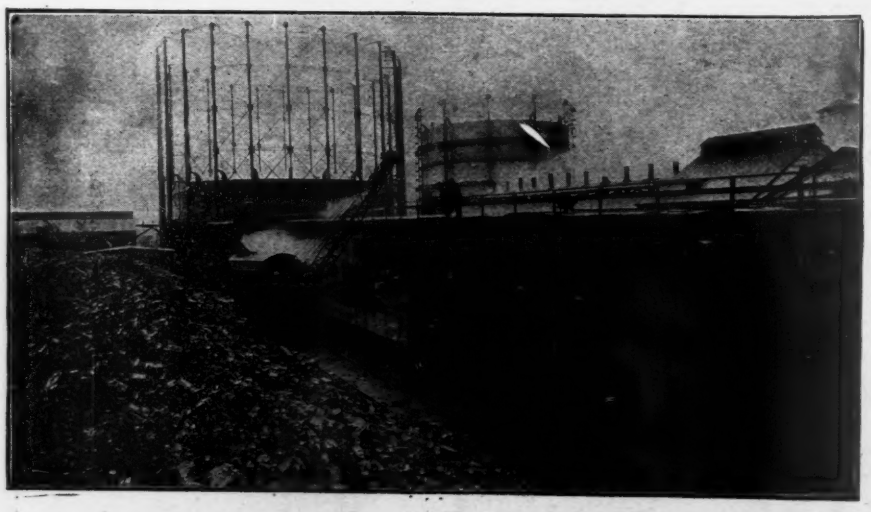
AND

THE WM. H. BRISTOL ELECTRIC PYROMETERS AND PATENT SMOKED CHART RECORDERS.



THE BRISTOL CO., WATERBURY, CONN.

New York, BRANCH OFFICES. Chicago,



WRITE for our Catalogue "O" just issued. This Catalogue deals entirely with "Brownhoist" Machinery as used at Artificial Gas Plants for handling coal, coke and other materials rapidly and economically.

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PRACTICAL HANDBOOK ON GAS ENGINES, WITH INSTRUCTIONS FOR CARE AND WORKING OF THE SAME,

By G. LIECKFELD, C.E. Translated with Permission of the Author, by GEORGE M. RICHMOND, M.E. Price, $1.

For Sale by A. M. CALLENDER & CO., 42 Pine St., New York City.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

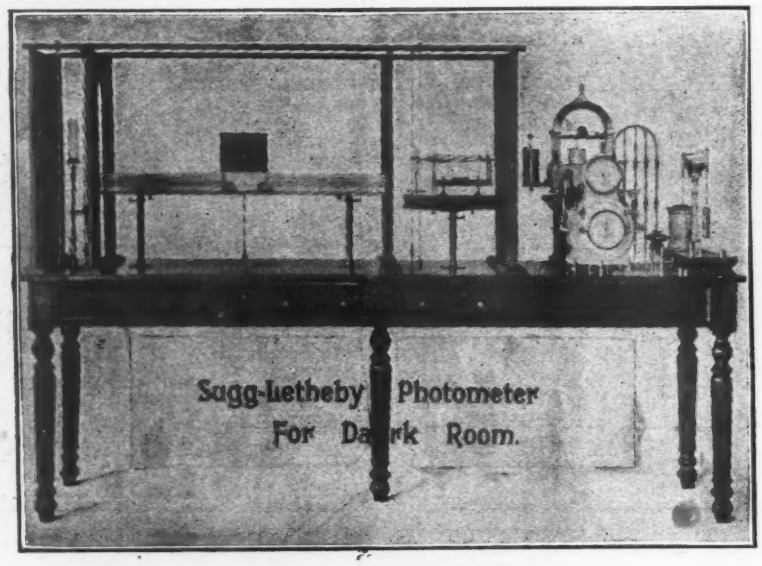
JANUARY, 1909.

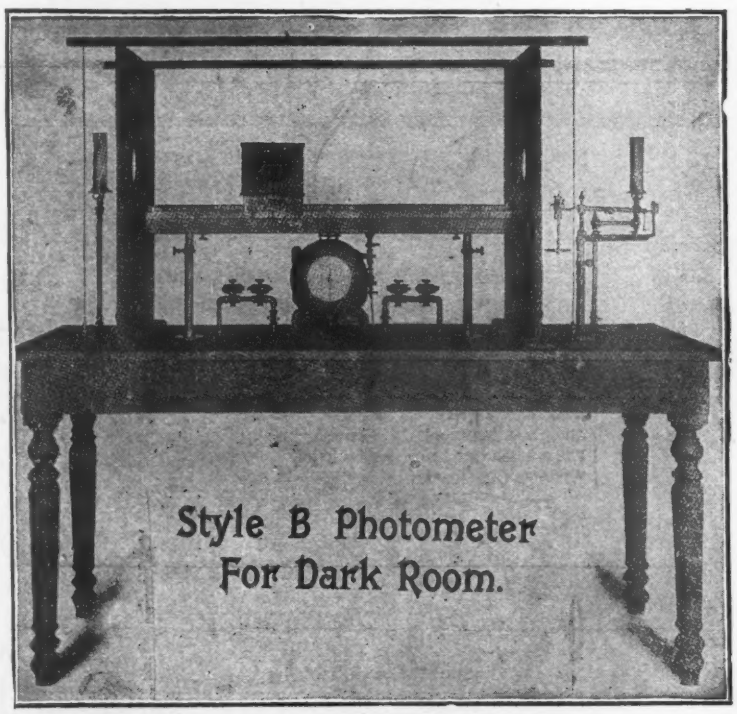
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Fri.	1	2.20AM	6.20 AM
Sat.	2	3.30	6.20
Sun.	3	4.30	6.20
Mon.	4	5.40	6.20
Tue.	5	No L.	No L.
Wed.	6	No L.FM	No L.
Thu.	7	No L.	No L.
Fri.	8	5.20PM	7.50PM
Sat.	9	5.20	8.50
Sun.	10	5.30	9.50
Mon.	11	5.30	10.50
Tue.	12	5.30	11.50
Wed.	13	5.30	12.50AM
Thu.	14	5.30LQ	1.50
Fri.	15	5.30	2.50
Sat.	16	5.30	3.50
Sun.	17	5.30	5.00
Mon.	18	5.30	6.20
Tue.	19	5.30	6.20
Wed.	20	5.30	6.20
Thu.	21	5.30NM	6.20
Fri.	22	5.30	6.20
Sat.	23	5.30	6.20
Sun.	24	5.40	6.10
Mon.	25	5.40	6.10
Tue.	26	10.00	6.10
Wed.	27	11.10	6.10
Thu.	28	12.20AM	6.10
Fri.	29	1.20	6.10
Sat.	30	2.30	6.10
Sun.	31	3.30	6.10

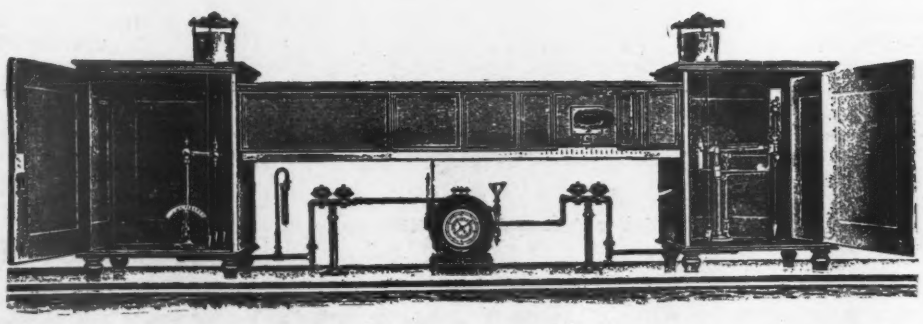
TOTAL HOURS DURING 1909.

By Table No. 1.

	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JANUARY, 1909.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A.M.
Fri.	1	4.12	6.27
Sat.	2	4.12	6.27
Sun.	3	4.12	6.27
Mon.	4	4.12	6.27
Tue.	5	4.12	6.27
Wed.	6	4.12	6.27
Thu.	7	4.12	6.27
Fri.	8	4.22	6.22
Sat.	9	4.22	6.22
Sun.	10	4.22	6.22
Mon.	11	4.22	6.22
Tue.	12	4.22	6.22
Wed.	13	4.22	6.22
Thu.	14	4.22	6.22
Fri.	15	4.32	6.17
Sat.	16	4.32	6.17
Sun.	17	4.32	6.17
Mon.	18	4.32	6.17
Tue.	19	4.32	6.17
Wed.	20	4.32	6.17
Thu.	21	4.32	6.17
Fri.	22	4.42	6.12
Sat.	23	4.42	6.12
Sun.	24	4.42	6.12
Mon.	25	4.42	6.12
Tue.	26	4.42	6.12
Wed.	27	4.42	6.12
Thu.	28	4.42	6.12
Fri.	29	4.47	6.07
Sat.	30	4.47	6.07
Sun.	31	4.47	6.07

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

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....OF AMERICA....

No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

Welsbach Junior

THE BIGGEST LITTLE LIGHT IN THE WORLD.

The Welsbach Junior Light is 5 inches high--consists of burner, mantle and chimney--and is attractively boxed in a pasteboard carton.

—o—

As its effectiveness and economy become better known the Welsbach Junior will supersede, for universal use in the home, the old-style open flame gas burners.

Showing Welsbach Junior Light used in connection with ordinary glass globe.

Gives 50-Candle Power.

Uses Two Feet of Gas per Hour.

Attaches to Any Gas Fixture.

Completely Hidden from View.

Use your own globe--either gas or electric.

SMALL—EFFICIENT—ECONOMICAL.

Welsbach Company,

FACTORIES:
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Salesrooms in all Leading Cities of the United States.

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Largest Builders of CARBURETTED WATER GAS PLANT IN AMERICA.

SOLE AMERICAN BUILDERS

OF THE

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1907 CONTRACTS.

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Nashua, N. H.
Augusta, Me. (2d contract).
Everett, Mass.
Jenkintown, Pa. (2d contract).
Coney Island, N. Y.
Mexico, Mo.
Jacksonville, Fla.
Syracuse, N. Y. (2d contract).
Atlanta, Ga. (2d contract).
Holyoke, Mass.
Peoria, Ills.
Schenectady, N. Y. (2d contract).
Danbury, Conn.
Galveston, Tex. (2d contract).
Quebec, Canada.
Indianapolis, Ind. (2d contract).
Bessemer, Ala.
Waterbury, Conn. (5th contract).
Sioux Falls, S. D. (3d contract).
Philadelphia, Pa.
New Hartford, Conn.
Poughkeepsie, N.Y. (2d contract)
Nashville, Tenn.
Salisbury, Md.
Norfolk, Va. (4th contract).
Wallingford, Conn.
Richmond, Va. (2d contract).
Oak Bluffs, Mass.
Arlington, Mass.

TOTAL SETS INSTALLED DURING YEAR, ... 43
TOTAL SETS INSTALLED TO DECEMBER 31, 1907, ... 677
TOTAL DAILY CAPACITY, TO DECEMBER 31, 1907, ... 545,865,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.
Waste Heat Boiler.
Hygrometer.
Venturi Meter for Measuring Flow of Air Blast.

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CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

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BALTIMORE RETORT & FIREBRICK CO.

BALTIMORE, MD.,

Manufacturers of all Material for the Construction of Coal Gas Benches.

HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

INCLINES—We have in SUCCESSFUL OPERATION benches of Inclined Retorts, MANUFACTURED and ERECTED by us.

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RAIL and WATER CONNECTIONS to ALL POINTS.

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GAS BENCH CONSTRUCTION COMPANY,

METROPOLITAN BUILDING, ST. LOUIS, MO.,

Engineers and Builders of all styles of Standard and Special Benches from one to twelve Retorts, Horizontal, Vertical, or Inclined.

We will guarantee "Better Benches," to be easier to control, make more gas per retort, and operate with less fuel than any bench on the market.

ALL WORKMANSHIP AND MATERIAL GUARANTEED.

JOHN DELL, *President and General Manager.*

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ESTABLISHED 1882.

MANUFACTURERS OF

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We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

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ECONOMIC DESIGN of Steel Structures, Reinforced Concrete, Masonry and Foundations.
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Bronder Patent Stoking Machinery.

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Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

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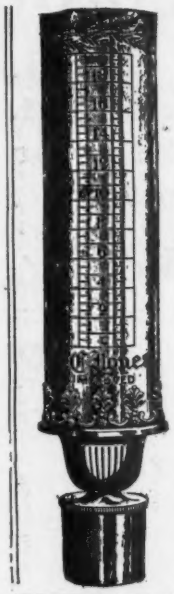

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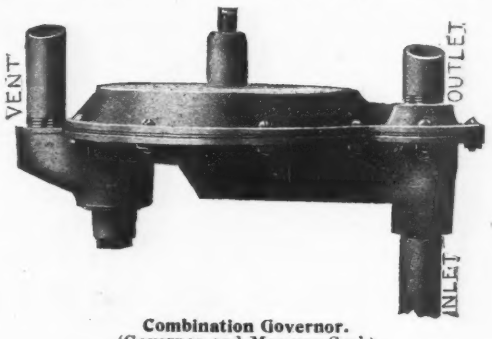

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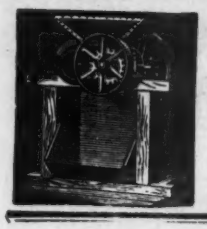

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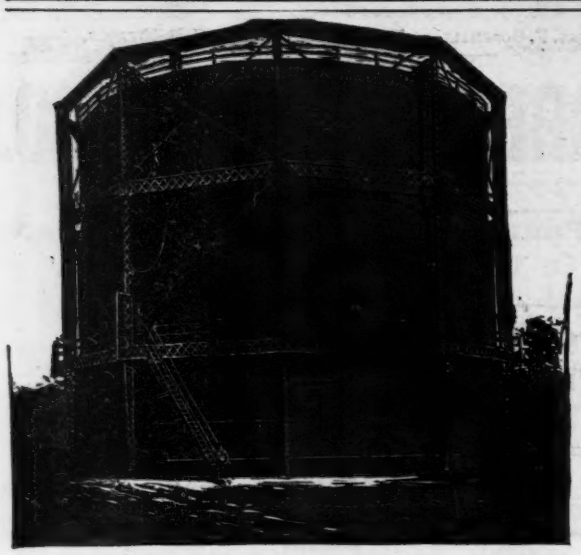

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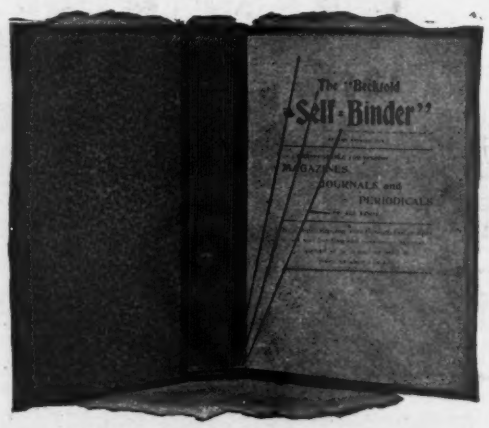

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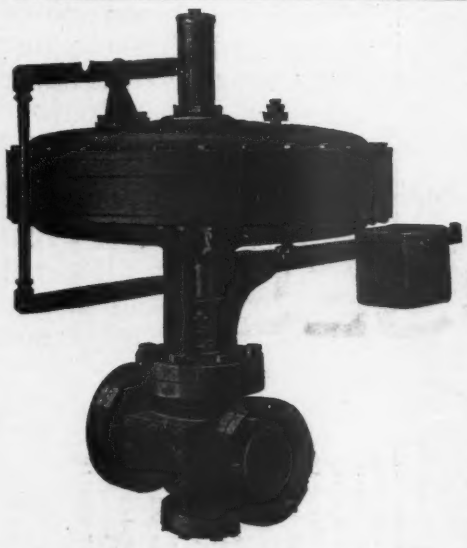

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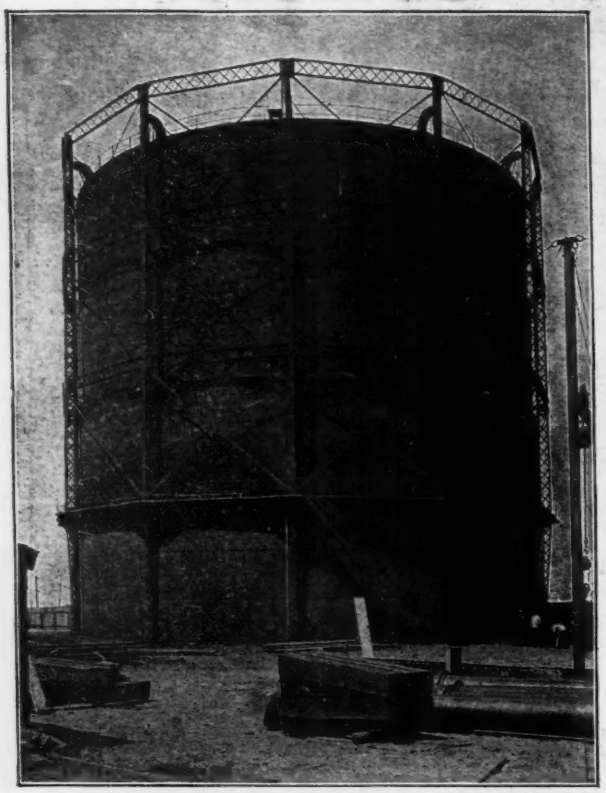

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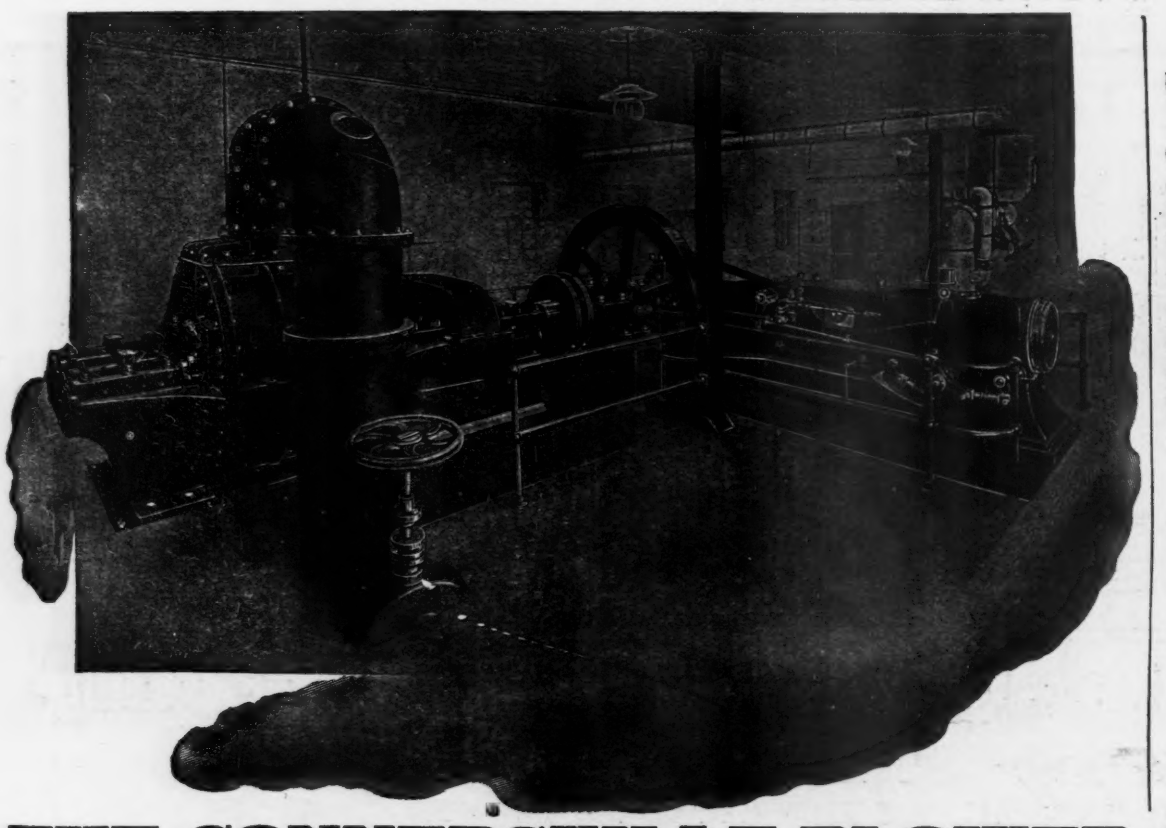

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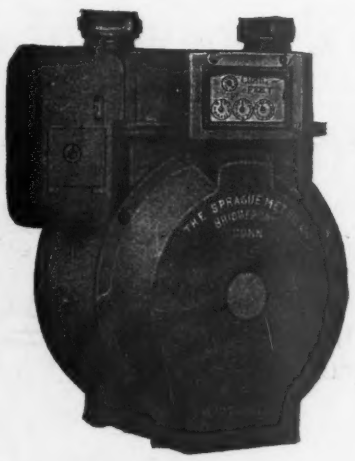

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